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Ownership and Recreational Use of Wetlands in the Grassland Water District and Refuges

of the Central San Joaquin Valley

SEPTEMBER 1988

prepared under contract
for the

FEDERAL-STATE
SAN JOAQUIN VALLEY DRAINAGE PROGRAM

This report presents the results of a study conducted for the Federal-State Interagency San Joaquin Valley Drainage Program. The purpose of the Report is to provide the Drainage Program agencies with information for consideration in developing alternatives for agricultural drainage water management. Publication of any findings or recommendations in this report should not be construed as representing the concurrence of the Program agencies. Also, mention of trade names or commercial products does not constitute agency endorsement or recommendation.

The San Joaquin Valley Drainage Program was established in mid-1984 as a cooperative effort of the U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, U.S. Geological Survey, California Department of Fish and Game, and California Department of Water Resources. The purposes of the Program are to investigate the problems associated with the drainage of irrigated agricultural lands in the San Joaquin Valley and to formulate, evaluate, and recommend alternatives for the immediate and long-term management of those problems. Consistent with these purposes, Program objectives address the following key areas: (1) Public Health; (2) Surface- and Ground- Water Resources; (3) Agricultural Productivity; and (4) Fish and Wildlife Resources.

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OWNERSHIP AND RECREATIONAL USE OF WETLANDS IN THE GRASSLAND WATER DISTRICT AND REFUGES OF THE CENTRAL SAN JOAQUIN VALLEY

Prepared for the
San Joaquin Valley Drainage Program
2800 Cottage Way, Room W-2143
Sacramento, CA 95825-1898

Under
U.S. Bureau of Reclamation
Contract No. 7-CS-20-05200

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September 1988

ACKNOWLEDGEMENT

The contributions of Don Mariciochi, John Beam, Joel Miller, Neil Nelson, Steve Sawyer, Tim Poole, Joyce Bigham, Trudy Wischerman, David Byrne, and the Grassland Water District are gratefully acknowledged.

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EXECUTIVE SUMMARY

The Grassland Water District encompasses 51,322 acres and 159 owners. It is divided into two sections: the North Grassland and the South Grassland. Highway 152 serves to demarcate these two regions. Properties in the North Grassland were larger on average than those in the Southern (391 acres to 256 acres, respectively).

Land use in the Grassland Water District produced three administrative options: waterfowl habitat, agriculture, or the combination of the two. Thirty properties grazed cattle during the off-season. Sixty-six percent of these properties were in the North Grassland. The 30 properties represented 19 percent of the acreage in the Grassland. The reason for the greater incidence of grazing in the North Grassland was seen to be a function of parcel size. The larger properties in the North accommodated the economies of scale inherent in the cattle industry. A correlation between land use and parcel size revealed that 54 percent of those properties grazing cattle were between 250 and 1,000 acres in size.

Farming was an alternative aspect of agricultural land use. Crop production was present on seven properties in the Grassland Water District accounting for less than four percent of the land in the District. The majority of parcels which had been converted to agriculture were situated along the periphery of the District. Most often these properties were owned by local residents who farmed properties which were contiguous with those reclaimed.

Cattle grazing was pursued by non-resident owners, that is, owners whose residency was other than the Grassland area, who used grazing contracts as a supplementary income. Due to the decline in beef prices and the scarcity of a reliable water source, cattle contracts have become more difficult to obtain. Adding to this the rise in duck club membership and the decreasing numbers of ducks, owners have, in recent years, opted to discontinue grazing in favor of a comprehensive waterfowl management program. The depressed land values and commodity prices will continue to forestall the advance of agriculture into the Grassland Water District.

Concerning parcel size, the largest category of properties in the Grassland Water District were found to be between 100 and 250 acres. These represented 39 percent of all ownerships. Parcels of larger than 1,000 acres contained nearly 30 percent of the land in the district indicating that a few owners had control of a vast proportion of the district. Thirteen percent of the ownerships, those properties over 500 acres in size, were found to own 45 percent of the land in the district.

There were two different types of ownership in the Grassland Water District: private and corporate. Private ownerships outnumbered corporate by a ratio of two to one. The larger the property the more likely it was to incorporate. Seventy-five percent of those properties 500 acres or more were incorporated. The higher costs of managing these properties no doubt resulted in the cost-sharing strategies found in corporate ownership.

There were three types of contract personnel found in the Grassland Water District: waterfowl managers, livestock managers, and caretakers. Thirty percent of all incorporated clubs utilized contract personnel in one capacity or another. Only 6.5 percent of the private clubs employed contract personnel.

An examination of the duck clubs was necessitated by the very nature of the water district, viz. to provide habitat for wintering migratory waterfowl. Among the 152 "active" clubs in the Grassland Water District there were two predominant classes: private clubs and commercial clubs. The two differed according to the club's propensity to rent duck blinds. Commercial clubs did so in excess of the private club and to the degree that owners were outnumbered by renters.

Duck clubs were supported in their efforts to maintain the wetlands as a sustainable wildlife habitat by three public support program: the Federal Easement Program, Water Bank, and SCS Cost-Sharing Program. Currently, 24,458 acres of the Grassland Water District is currently enrolled in the Easement Program which ensures the use of this land for waterfowl habitat in perpetuity. The relationship between support programs and the type of ownership indicated something of the interests of Grassland owners. Eighty percent of the clubs employing waterfowl managers and signed Easement agreements. Seventy-five percent of these were corporate ownerships. Enrollment in all three programs simultaneously was seen to be an indication of the club's commitment to waterfowl habitat. The relationship between enrollment in support programs and the presence of a contract waterfowl manager seemed to be unidirectional as managers encouraged property owners to participate in these programs.

Finally a comparison between the user of the Public Refuge System in the Grassland area and the private duck club hunter revealed that the refuge hunter was younger and had a lower income than the club hunter. Refuge hunters were described as beginning hunters who had yet to commit resources or interest to the activity. Other social and demographic characteristics of the public refuge hunter were comparable to the club hunter. A profile of the typical waterfowl hunter in the Central San Joaquin Valley was derived from two hunter surveys conducted at Los Banos Wildlife Area and San Luis National Wildlife Refuge.

The Grassland Water District is unique in its commitment to waterfowl management. Surrounded by agricultural lands, its insular existence remains a testament to the foresight of early conservationists and the perseverance of present-day owners and users.

1.0 INTRODUCTION

California's Central Valley is the most important wintering area for migratory birds of the Pacific Flyway. Approximately 60 percent of the birds in that Flyway satisfy some of their migratory or wintering requirements in the Valley. The Grassland area is the largest remaining contiguous tract of wetlands in the San Joaquin Valley. As such it plays an important role in the continued viability of Pacific Flyway populations of migratory birds.

The Grassland Water District represents some 51,322 acres of land and composes the core of the remaining wetlands in the San Joaquin Valley. Incorporated in 1954, the water district operates on behalf of private land holders to deliver water for agricultural and wildlife purposes. Within the boundaries of the water district there are 163 distinct units, identified as such by mapping and Deeds of Trust in the County Assessors Office, Merced County. These units are managed as private duck clubs and maintain minimal improvements for human habitation. Quonset huts, tent cabins, and cabins composed the typical sleeping quarters for hunters. The clubs themselves are often vacant tracts of land replete with a developed water delivery system for ponds and duck blinds common to their purpose.

Off-season use of the land includes cattle grazing, rabbit and dove hunting, trapping, and fishing. Seasonal and full-time caretakers compose the resident population during the summer and spring months and few of the club members were found to participate in any of these activities.

The objective of this study is to consider the fragmented face of the Grassland Water District. Among the 163 units or parcels in the district there were 159 owners, each with a slightly different approaches to land management. Within the context of our analysis we have attempted to compile data on the patterns of land ownership including residency and type of ownership. Second, we have considered land in terms of parcel size and use. Third, we have drawn both of these items together in evaluating management practices as a function of ownership and/or characteristics of the land (i.e., size, location within the district, and access to reliable fresh water sources).

Our purpose in considering the Grassland Water District from these few points is to develop baseline measures of the social conditions of land ownership and use for purpose of program planning. This data, we anticipate, will be used by representatives of the different agencies involved in the San Joaquin Valley Drainage Program to gain an understanding of the demographic and socio-economic characteristics of owners and users of the area and to establish a basis for assessing the probable impact of different courses of action on these individuals.

In addition To information on the Grassland Water District, data from the four Grassland area refuges--San Luis National Wildlife Refuge, Kesterson National Wildlife Refuge, Los Banos Wildlife Area, and Volta Wildlife Area--is presented as well. Using existing data sources including user statistics, user surveys, and user waiver statements, the social and demographic characteristics of hunters are profiled. The presence of these data enabled us to compare the users of the private duck club with those of the public refuge system.

1.1 A Brief History of the Grassland Water District

The Grassland Water District is located in the San Joaquin Valley approximately 45 miles west of Merced. It is divided into two sections, the North Grassland and the South Grassland. With respect to each, the North Grassland contains larger single tracts of land than the South Grassland, which, in turn, exhibits less diversity in parcel size and land use than the North Grassland. The line of demarcation between the two sections is marked by State Highway 152, which follows an east-west course between Interstate 5 and Highway 99 at a point transecting the town of Los Banos.

Lands contained within the Grassland Water District were originally part of the Miller and Lux estate. As part of the San Joaquin River flood plain, this area provided wintering habitat for migratory waterfowl along the Pacific Flyway. Beginning in 1926 the Miller and Lux Corporation began selling what amounted to 98,234 acres of the estate to ranchers and waterfowl enthusiasts. These owners continued to rely on the Miller and Lux Corporation for irrigation for livestock and wintering waterfowl. This water was composed of river flows which exceeded the crop requirements of Miller and Lux. In 1939 Miller and Lux sold the water rights for this acreage to the Bureau of Reclamation for construction of the Central Valley Project (CVP). An agreement was made between the Bureau of Reclamation and Miller and Lux which allowed the Corporation to continue to deliver water to their cropland and to Grassland users. This agreement was to remain in effect until the CVP became fully operational.

Upon completion of Friant Dam in 1944 the Grassland owners were confronted with the immediate problem of securing adequate water to maintain their activities. In 1944 the Grassland Mutual Water Association was formed by the Grassland owners to petition the Bureau of Reclamation to continue water deliveries until the opening of the Delta-Mendota Canal in 1953. At the same time legislation appeared in the U.S. Congress concerning the maintenance of winter habitat for waterfowl. On August 1, 1954, Public

Law 674 was passed authorizing the CVP to include fish and game resource considerations in their plans.

An out of court settlement between the Bureau of Reclamation and the Grassland Mutual Water Association in 1954 awarded the latter a quantity of 50,000 acre-feet per year. The Grassland owners organized themselves as the Grassland Water District in contracting for this water with the Bureau of Reclamation.

Considering the Grassland Water District as a resource requires the recognition of its particulate nature. The Grassland Water District is a composition of several parcels of land, each independently owned and managed. The water district operates in a limited capacity as representative of these properties. Its primary purpose is the delivery of Bureau water to wildlife areas in the district. Sources of revenue for the water district are of three kinds: (1) standby charges applied to owners in the district, (2) sale of water, and (3) sale of drainage rights. In the case of the latter, the Grassland Water District contracts with neighboring water districts to drain unwanted water through their property. This water was traditionally recycled by the Grassland Water District for summer irrigation. Since the 1984-85 wintering season the Grassland Water District and the U.S. Fish and Wildlife Service have recommended against the use of agricultural drain water from upslope sources.

Water contracts within the District are restricted to lands dedicated to waterfowl habitat. Properties introducing agriculture or other modified uses may not receive water from the District.[1] A section of the bill authorizing the Bureau of Reclamation to supply the Grassland Water District with water calls for "the delivery of water to public organizations or agencies for use within the boundaries of such organization or agencies for waterfowl purposes." The cost of such water was limited to the prevailing cost of class 2 water.[2]

Since the Grassland Water District is itself merely a composite of independent tracts an examination of the district should begin with a profile of these properties. The activities and consequent nature of the District are to be found in the diversity of these properties. The following portion of the report deals with an exposition of ownership and land use in the Grassland Water District.

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[1] Lands which are used for agricultural or other non-waterfowl purposes can receive only agricultural drain water through the Grassland Water District conveyance system.

[2] Public Law 674 passed on August 1, 1954.

1.2 Land Ownership in the Grassland Water District

A study of land ownership was made using the California Agri-Land Property Ownership maps prepared for Merced County. The most recent edition of this report, 1987, was used in this study. Plat maps and guides provided the names, addresses, and the assessed value of each property. Superimposing the map of the Grassland Water District, property owners within the District boundaries were identified and their addresses noted for later reference.

The Grassland Water District presently embraces 51,322 acres including State of California and City of Los Banos holdings. The average size of parcels owned by individuals in the Grassland is 322.77 acres. In the North Grassland the average size of parcels is 391.38 acres per owner and in the South 256.72 acres per owner (Table 1).

Table 1: Acreage in the Grassland Water District

	Grassland W.D.	N. Grassland	S. Grassland
Total acreage	51,322	30,528	20,794
Average size of parcels (acres)	323.0	391.4	256.7

A survey of land owners in the Grassland Water District indicates a total of 159 owners including the State of California (Los Banos Wildlife Refuge Area) and the City of Los Banos. The total number of land owners in the South Grassland (81 owners) exceeds those in the North (78 owners) by a count of three (Table 2).

Table 2: Total Ownerships in the Grassland Water District

	Grassland W.D.	N. Grassland	S. Grassland
Number of Owners	159	78	81

Among the 159 individual landowners in the Grassland Water District there are four owners who hold fee title to more than one parcel. Only two of the four owners operate these properties as duck clubs. The two remaining owners are residents of the Grassland area who own agricultural land adjacent to the Water District. Both of these parcels are being used for agricultural purposes.

1.3 Land Ownership Versus the "Duck Club" as the Unit of Analysis

Using land ownership to scrutinize land use in the Grassland Water District caused some confusion during the course of data collection. Land ownership alone fails to consider the day-to-day management practices which underlie the role of the Grassland Water District as a wildlife resource conservation area. For this reason it is important to point out the differences between land ownership and the individual duck clubs which compose the Water District.

The total number of duck clubs in the Grassland Water District is 163. The term "duck club" is used to indicate a parcel of real property which has at one time operated as a duck club and has been so recognized by the Grassland Water District through water contracts and mapping. This figure does not include the Los Banos Wildlife Refuge Area but does include property owned by the City of Los Banos and all those lands which have since been converted to agriculture and no longer serve a recreational purpose.

Among the 163 distinct units which have functioned as duck clubs at one time or another there are 152 "active" duck clubs. An "active" duck club is defined here as a club which flooded at least some portion of its land during the 1986-87 waterfowl season. There are 74 active clubs in the North Grassland excluding the State of California and all parcels converted to agricultural use and 78 active clubs in the South Grassland.

In a comparison between property ownership and the duck club, the average size of holdings per owner was found to be 301.12 acres while the average size of clubs was 293.73 acres (Table 3). The fact that the number and size of ownerships closely matched those of the duck clubs in the GWD provided support for using ownership as the unit of analysis when considering land use in the district.

Table 3: Size of Parcels Versus Size of Clubs

	Grassland	N. Grassland	S. Grassland
Average Size of Parcels per Owner	301.1	351.1	253.0
Average Size of Club	293.7	346.7	243.9

2.0. LAND USE IN THE GRASSLAND WATER DISTRICT

2.1 Three Types of Land Use

Following land ownership a profile of the Grassland Water District (GWD) must consider land use. That is, what are the various economies applied to sustaining ownership in the Grassland Water District?

Land use in the district reflects three administrative choices: waterfowl habitat, agriculture, or the combination of the two. Management of waterfowl habitat in the District varies between two extremes. On the one hand there are those properties which exhibit labor-intensive marsh development including food and brood production through land levelling, construction of water control structures, and the cultivation of feed. At the other extreme are properties that employ minimal management efforts in the use of land. Owners practicing the latter reach their properties a few weeks prior to the start of the season in order to flood their ponds. On the last day of the season these ponds are drained and left dormant until the following year. The majority of properties in the Grassland Water District practiced techniques which shared aspects of both management plans.

Agricultural use in the Grassland Water District includes both farming and cattle grazing. A handful of properties within the Grassland Water District have been reclaimed for farming and permanent pasture. During the course of the study, cotton, sugar beets, and alfalfa were being produced on these properties.

The integration of waterfowl and agricultural use has been practiced since the days of Miller and Lux. Clubs have historically employed this tactic to defray operating costs and to maximize the utility of the land. Grazing contracts turned land ownership into a capital as well as a recreational investment for many early day owners. Today, properties in the Grassland Water District still graze cattle during the summer, introducing them immediately following the waterfowl season. The distinction between farming and grazing, from the standpoint of the District, is that cattle grazing is deemed to be an appropriate or sanctioned use of the land while farming is inappropriate. Land which has been converted to farming can not purchase contract water from the District, that is, water received from the Bureau of Reclamation. Properties grazing cattle may purchase water under contract with the GWD.

The combination of agriculture and waterfowl habitat involving crop production was present on only one property in the GWD. The remaining cases combined waterfowl use with seasonal cattle grazing. In the first instance a portion of the property was planted in alfalfa while the remaining acreage was ponded for waterfowl.

The relationship between waterfowl and grazing, though seemingly oppositional, has in many cases proven beneficial to waterfowl and livestock. Through conscientious management (e.g., maintaining minimum numbers of cows per acre) livestock management helps defray land improvement costs which support waterfowl production.

Among the 159 owners found in the Grassland Water District, 30 graze livestock on their properties, as shown in Table 4, and seven farm their land. Among the 30 owners who utilize livestock as an option, nine are residents of the drainage area as shown later in Table 5. There are only three properties which favor livestock production to waterfowl and have converted their lands to permanent pasture. The remaining 26 combine livestock with waterfowl management. Only one of the seven owners who have converted their lands to agriculture still attempts to provide waterfowl habitat. This owner has divided his property between alfalfa and duck ponds as mentioned above.[3]

Approximately 20 percent of the total acreage in the Grassland Water District is grazed seasonally. In the North Grassland which has demonstrated a persisting interest in livestock management this figure is 22.5 percent. This is a result of larger sized parcels in the North and the availability of good quality fresh water. Of the 10,086 acres that are grazed the majority are used as waterfowl habitat during the winter months. Only 912 acres are known to be in permanent pasture. About 1,820 acres, or roughly four percent of the Grassland Water District, has been converted to agricultural use, most of this is in cotton, beets, and alfalfa.

Properties that have been converted to agricultural use are located at the periphery of the Grassland Water District. The atmosphere of investment and expansion that marked the early 1980s prompted farmers to buy up marsh lands in order to increase their operations. Land which sold for $1,500 per acre was converted at marginal costs (one estimate placed it at $300 per acre) to suitable farm land. At $1,800 per acre this figure was well below the $3,000 per acre the market was paying for similarly improved lands in the Greater Central Valley. The properties which were bought during this time fell along the perimeter of the Grassland Water District because they were often contiguous with tracts owned by the buyer. The agricultural properties which fall within the boundaries of the Grassland Water District evidence this pattern of development.

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[3] Information on current land use was obtained from the Grasslands Water District.

Table 4: Land Use Patterns in the Grassland Water District

	Grassland W.D.	N. Grassland	S. Grassland
Properties Grazing Livestock	30	20	10
Acreage Grazed	10,086	6,855	3,231
Percent of Acreage Grazed	19.7	22.5	15.5
Properties Farmed	7	6	1
Acreage Farmed	1,823	1,502	321
Percent of Acreage Farmed	3.6	4.9	1.5

2.2 Farming and Its Effect Upon the Grassland Water District

Owner Residency versus Land Use

Farming in the Grassland Water District is practiced by resident growers who have secured District lands in a process of increasing production. A comparison of owner residency with land use is given in Table 4. Six of the seven owners who have converted to agricultural use are residents of the Grassland area.[4] The seventh owner is from Merced but farmed in the Dos Palos area. All six residents own additional agricultural property within the Greater Grassland area.

As shown in Table 5, nine of the 30 owners grazing livestock are residents of the Grassland area as compared to 21 non-resident owners who graze cattle on their properties. Five of the nine resident owners own property other than that within the Grassland Water District. Included among the resident owners is the City of Los Banos, which has leased its 311 acre parcel for permanent pasture.

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[4] For the purposes of this study the Grassland area is defined as that region of land stretching between Newman and Mendota from the Delta-Mendota Canal to the San Joaquin River.

Table 5: Residency of Ownership by Land Use

	Drainage Area Resident	Non-resident
Livestock	9	21
Farming	6	1

The structure of modern agriculture enables a grower to farm multiple sites as long as the benefits of land procurement exceed the cost of production, harvesting, transportation, and storage. Cattlemen are not as flexible because the cattle business is less robust and displays a narrower band of profit. Cattlemen seek large tracts of land where a herd can be grazed for long periods of time under limited management. Small parcels require the cattleman to move his herd more often. Facing more rigorous economies than the farmer, cattlemen will opt to reduce costs by selecting large tracts. A look at grazing contracts by parcel size is given in Table 6.

Table 6: Grazing Contracts by Parcel Size

Acres	0-100	100-250	250-500	500-1000	1000+
Total Acres	224	649	2,791	5,317	1,100
Properties Grazing	3	4	9	7	1
Percent of Total	10.3	13.8	30.0	24.1	3.5
Percent of Properties within Category	10.3	6.4	19.6	58.3	11.1

Size of Parcel versus Land Use

Over half of those properties in the District which graze cattle are between 250 and 1000 acres in size (Table 6). More significant is the percentage of properties within each acreage category dedicated to grazing. In the case of properties 500-1000 acres in size, nearly 60 percent of these properties are grazed. The fact that only ten percent of 0-100 acre properties are grazed seems to support the cattleman's need for large tracts of land. Further evidence is given by the practices of owners themselves. Within the 100-250 acre category five owners have collectively agreed to provide land for grazing. The total of their acreage is 228 acres. In other cases two sets of brothers have obtained grazing contracts. By combining their acreage they obtain totals of 349 and 556 acres, respectively.

Land use patterns in the Grassland Water District indicate that owners are shifting away from the integration of waterfowl and cattle. Those owners who continue to graze are typically non-residents whose properties averaged 500 acres or more. Motivated by the financial burden of operating the larger clubs these individuals continue to seek cattle contracts. However, as the cost of club memberships increase (as a result of the increasing costs of land improvement and water) and as grazing contracts become more and more scarce and less and less profitable club owners may seek to improve the club's hunting potential by eliminating cattle and dedicating themselves to a waterfowl management plan.

3.0 CHARACTERISTICS OF PROPERTIES IN THE GRASSLAND WATER DISTRICT

3.1 Parcel Sizes

We have considered ownership to this point as a means of unitizing the Grassland Water District. To consider ownership more closely we need to focus on the particular character of each unit or tract beginning with parcel size.

The distribution of parcels by size, the percentage of parcels in each category, total acreage, and the proportion of total acreage within each category is detailed in Table 7. These figures include both the State of California and the City of Los Banos.

Table 7: Distribution of Parcels by Size[5]

Acres	0-100	100-250	250-500	500-1000	1000+
Number of Ownerships	29	63	46	12	9
Percent of Parcels in Category	18.2	39.6	28.9	7.5	5.7
Total Acreage	2,049	10,357	14,925	8,661	15,330
Percent of Total Acreage in Grassland Water District	4.0	20.2	29.1	16.9	29.9

The greatest percentage of parcels in the Grassland Water District are between 100 and 250 acres. These properties represent nearly 40 percent of the ownerships in the District. There are nine clubs of 1000 acres or more, representing 5.7 percent of the ownerships. Six of these are located in the North Grassland.

The proportion of total land by categories reflects a balanced distribution, particularly among the larger categories. Only the 0-100 category is underrepresented with four percent of the Grassland in this size range. Properties of 250-500 acres and above represented 75 percent of the total acreage in the District while those properties less than 250 acres contained 25 percent of the Grassland Water District. A comparison between the percent of parcels in each of the acreage categories and the percent of the GWD encompassed by this category reveals that even though 50 percent of the ownerships are properties 0-250 acres, these same properties compose only 25 percent of the District. Alternatively, the nine ownerships of 1,000 acres and above compose 30 percent of the GWD while amounting for only 5.7 percent of the ownerships. Roughly 45 percent of the District is divided into parcels sizes of 500 acres and more. Only 13.2 percent of the ownerships in the district own 45 percent of the land within the district. Given the fact that voting power is determined by acreage among the newer clubs, one might conclude that the GWD is vulnerable to leverage by a restricted ownership. There is, however, no evidence of any such political inequity resulting from land ownership to date.

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[5] The acreage categories used to create this distribution were suggested by John Beam of the California Department of Fish and Game, Los Banos, California.

3.2 Type of Ownership in the Grassland Water District

The uniqueness of the Grassland Water District as marsh habitat prompted an analysis of types of ownership. The two prevalent forms of ownership found in the GWD, private and corporate, were similar to the types of ownerships found in agricultural districts. Ownership in the Grassland Water District, however, included a higher number of shared partnerships than might be anticipated for a district dedicated solely to agricultural use.

Shared partnerships utilize the exchange-value of club memberships as a means of proportioning the fee title of the property. A single owner may choose to purchase additional memberships as they become available thereby securing a majority of the ownership. Alternatively, a group of individuals may negotiate, at the time of purchase, the proportional distribution of ownership. Five individuals, for example, may purchase a parcel of land with the agreement that there be ten portions. One of the buyers may purchase three of the ten portions, another, two portions, still another two until the full purchase price has been met. The distribution of physical improvements such as clubhouse or cabin facilities are typically shared equally among the owners regardless of the arrangement between partners.

The number of shared partnerships increases as the cost of real property increases, yet the distribution of ownership within a partnership moves towards individual ownership as the cost of ownership increases. Although these two statements appear contradictory they are the result of natural forces operating in the Grassland Water District. Original purchases are often made by a group of individuals under a partnership agreement. As the cost of property management increases and the value of the real property declines, partners will seek to sell their share of the ownership. These memberships are often made available to the remaining partners before being placed on the open market. Current practices indicate that partners are buying additional memberships and, thus, moving ownership towards limited arrangements as the costs of ownership and management increase. Among incorporated ownerships this trend does not appear.

There were found to be 51 corporate agreements and 106 private ownerships in the Grassland. These numbers do not include the parcels owned by the State of California or the City of Los Banos.

A glance at Table 8, which shows the distribution of incorporated ownerships by size of the property, indicates that incorporated ownerships were prevalent among the larger parcels. The percentage of incorporated ownerships within each category is given as well.

Table 8: Corporate Ownership By Size

Acres	0-100	100-250	250-500	500-1000	1000+
Total Number of Corporate Ownerships	3	16	16	9	7
Percent of Corporate Ownerships within Category	5.9	31.4	31.4	17.6	13.7
Percent of Ownerships within Category that are Incorporated	10.3	25.4	34.8	75.0	77.8

The percentage of corporate ownerships among properties 100-250 and 250-500 acres was 31 percent. Nearly two thirds of all corporate ownerships were within these two acreage ranges. Incorporated properties 1000 acres and larger accounted for only 13 percent of all incorporated clubs. Seventy-five percent of all clubs 500 acres and larger were incorporated. Large clubs, which typically have large memberships and higher operating costs, tend to incorporate in order to minimize costs of ownership. Sharing ownership amongst the membership was the principle underlying this strategy.

4.0 RESIDENCY OF GRASSLAND WATER DISTRICT LANDOWNERS

We have already considered owner residency in the study of land use. Here residency is given a more exacting review. The question of owner residency was complicated by the various forms of ownership operative in the Grassland Water District. In cases of single person ownership the affixed address given by the Agri-Land Property Ownership Maps was an adequate indicator of residency. However, when ownership was shared under a corporate or partnership agreement there remained some doubt as to the residency of all owners. In order to better determine residency a mailing list provided by the Grassland Water District was used to supplement information obtained from the Agri-Land Property Ownership maps. The mailing list often included the names and addresses of all the owners listed under a partnership. In all cases residency of the ownership was determined by a majority count. If two of three owners were found to come from a single region or city, this location was considered as the point of residency. In very few cases was this necessary, however, as most shared ownerships were among individuals who also shared residency in a single town or region. In the case of shared ownership within a family, individuals were found to reside in close proximity to each other.

Residency data provided by both sources of information did not reference the actual ownership of incorporated clubs. Residency of the 87 corporate owners of the Hollister Gun Club, for example, was unavailable and, in these cases, was assigned to the address listed in the Agri-Land Property Ownership maps.

Owner residency has been considered in two ways. The first is geographical, the second is in terms of linear distances (driving distances). The total number of ownerships (157) used in a comparison of residency does not include the State of California or the City of Los Banos.

Geographical

Four geographic areas were selected to differentiate ownerships. They were: 1) the Greater Grassland area including the towns of Newman, Gustine, Los Banos, Dos Palos, and Firebaugh; 2) the Central Valley; 3) the Bay area including San Francisco, San Jose, Santa Clara, Palo Alto, Salinas, Monterey, Soledad, and Santa Cruz; and 4) the rest of California. These areas are categorically significant as they maintain certain sociological characterizations represented by their nomenclature. In addition, they were manifest in the discussions of ownership between water district administrators and among the owners themselves.

An examination of ownership revealed 29 owners, not including the City of Los Banos, with addresses in the Grassland area (Table 9). There were two ownerships with local affiliations which were not included with the 29 named above. The first was an incorporated duck club whose membership was known to include residents of the Grassland area. Since there was no way to determine the percentage of members this represented the Menlo Park address given by Agri-Land index was given greater weight. The second was also an incorporated club with a local address. Club representatives, however, revealed that the ownership was composed of individuals from outside of the Grassland area and this was given weight over the address found in the maps.

Two ownerships with addresses outside of the Grassland area were included as residents of the area. The first had been owned by a Los Banos resident who had deeded the property to a daughter living in Los Altos. This parcel is presently being farmed by the original owner. The named owner of the second parcel has a Bakersfield address but the land is being farmed by a family member living in the Los Banos area.

Table 9: Residency of Ownership (Geographic Locations)

	Grassland Area	Central Valley	Bay Area	Rest of California
Total Number	29	33	85	10
Percent of Total	18.5	21.0	54.1	6.4
Total Acreage	6,134	10,820	29,793	1,307
Percent of Total Acreage in GWD	12.8	22.5	62.0	2.7

Sixty-two percent of the total acreage in the Grassland Water District was owned by residents of the Bay Area. Only 13 percent is owned by residents of the Grassland area. Another 23 percent of the land is owned by residents of the Central Valley. The general pattern of ownership revealed the limited use of the GWD by residents of the Central Valley. Bay Area populations, who have traditionally sought recreational diversion in the Grassland area, own the majority of the water district.

Looking at the average size of parcels by residency reveals that Bay Area owners, in addition to owning the largest percentage of the Grassland, own comparatively larger parcels than owners from the other three regions (Table 10). Given their interest in the area for recreational waterfowl hunting, Bay area owners may perceive large parcels to be advantageous with regard to hunting success. Additionally, residents of the Bay Area may be more financially established than residents of the Central Valley, thus, enabling them to purchase larger properties. Inversely, resident owners may be concerned more with agriculture than waterfowl and tend to purchase small, peripheral parcels for farming.

A second trend among ownership explains to some degree the larger size parcels owned by Bay area residents than Grassland residents. Among the former ownership tends to be an enterprise where several individuals (up to 87 in the case of the Hollister Club) form a corporation to purchase the club. The extent to which these individuals interact is often limited to the arrangement of ownership. In contrast, resident owners tend to form partnerships within the social group. The corporate ownerships which were found to exist among Grassland residents had fewer owners with more intimate links between them. Given the smaller, more subjectively organized ownerships among Grassland residents their ownerships tended towards smaller properties where five to six people could hunt comfortably.

Table 10: Size of Parcel by Owner Residency

	Average Size of Parcel
Grassland Area	211.5
Central Valley	327.9
Bay Area	350.5
Rest of California	130.7

The 85 owners living in the Bay area may be further divided by the categories East Bay, San Francisco, and Monterey Bay (Table 11). Twenty-two of the East Bay ownerships have San Jose addresses. The ownership from Soledad is included in this category.

Table 11: Residency of Bay Area Ownership

	Total Number
East Bay	57
San Francisco	7
Monterey Bay	21

Linear Distance

The distribution of ownerships expressed in driving distances is given in Table 12. Distances of less than 50 miles, 100 miles, 200 miles, and more than 200 miles were selected as categories for this analysis.

Table 12: Residency of Ownership (Linear Distances)

Miles from Drainage Area	<50	50-100	100-200	>200
Total number	29	64	55	9
Percent of Ownerships	18.5	40.8	35.0	5.7
Acreage	6,134	21,693	18,993	1,234
Percent of Total Acreage in GWD	12.8	45.1	39.5	2.6

Seventy-five percent of the owners within the Grassland Water District live between 50 and 200 miles from the Grassland Water District. These owners own nearly 85 percent of the total acreage in the District. Local owners, representing 18 percent of the total ownerships, own 13 percent of the land. Those owners whose place of residency is greater than 200 miles (5.7 percent of the total ownership) own roughly three percent of the total land. Viewing owner residency overall, the proportion of land owned by each category of residency gives no indication of skewedness. That is, no single group controls a majority of the land. This pattern of ownership appears consistent with the fact that the secondary use of the land is as a wildlife resource conservation area.

The predominance of ownerships from metropolitan areas, in particular the Bay area, has existed since before the GWD was established in 1954. Given the recreational emphasis in the Grassland Water District, the relatively high percentage of non-resident ownership is anticipated.

5.0 PROPERTY MANAGEMENT IN THE GRASSLAND WATER DISTRICT

Given the profile of ownerships presented in the previous sections, we can begin to consider the independent practices of each with regard to the objectives of the Grassland Water District. In the ever-changing Grassland Water District, poor water quality, depressed land values, high club memberships costs and hunting fees, and reduced bag limits on waterfowl have created a critical situation wherein property management is seen to be a means to stay economic failure. Within this context three types of property managers have arisen: Contract waterfowl managers, livestock managers, and caretakers.

The growing concern with water management in the Grassland has moved a number of owners to employ contract personnel to manage waterfowl habitat. These managers perform a variety of tasks including water management, land preparation, blind and pond construction, and the cultivation of food plants (grasses). The waterfowl manager is typically responsible for flooding, irrigation, and the maintenance and construction of water facilities. Livestock managers often reside on the property during the off-season serving as property managers and cattle ranchers simultaneously. They may irrigate for cattle, but they are seldom involved in pond development or irrigation of food plants for waterfowl. There is some slippage between the categories of waterfowl and livestock manager since the latter's duties might include water management, mowing, discing, and general maintenance around the club. The third category of manager is the caretaker. Duck clubs have traditionally employed caretakers to protect private property during the off-season. The caretaker is not involved in either waterfowl or livestock management. The caretaker provides almost no water management during their tenure.

The presence of contract labor and management in the Grassland Water District is consonant with the agricultural interests of the Greater San Joaquin Valley. However, in contrast to the surrounding area, the GWD exhibits a disproportionate number of owner-operated properties with little or no contract labor present. The extent of labor requirements on these properties is sufficiently low as to necessitate only one or two persons per year. This, of course, varies with the intensity of the work projects undertaken by the ownership. Table 13 considers the number of ownerships employing each type of manager. As shown in Table 14, only one of the properties utilizing a manager was owned by a resident of the Grassland area. The distance the owner lives from the Grassland Water District appears to be a factor in the decision to utilize a manager (Table 15).

Table 13: Contract Personnel on the Duck Club

	Total Number	N. Grassland	S. Grassland
Contract Waterfowl Manager	10	7	3
Livestock Manager	4	3	1
Caretaker	8	4	4

Table 14: Residency of Ownership (Geographic Location)
by Type of Manager

	Drainage Area Resident	Non-resident
Waterfowl Manager	0	10
Livestock Manager	0	4
Caretaker	1	7

Table 15: Residency of Ownership (Linear Distance) by
Type of Manager

Miles from Drainage Area	<50	50-100	100-200	>200
Waterfowl Manager	0	5	5	0
Livestock Manager	0	1	3	0
Caretaker	1	2	5	0

An analysis of the tables comparing residency to contract management indicates that owners living less than 50 miles from the Grassland Water District seldom employ contract managers while those living between 50-200 miles employ all three types of managers. In the case of caretakers, the motivation is precautionary with the security of private property at stake. With waterfowl and livestock management the implication is that residents living within 50 miles provide their own labor as required by the task. Owners with residency more than 200 miles away did not hire managers of any kind, although club members and owners revealed that nearly every club had someone available to check on the property and to receive water deliveries if necessary. The fact that ownerships 50-200 miles from the District use contract personnel while those 200+ miles do not indicated that the former are more committed to developing the club for waterfowl habitat than the latter. It is possible that 200 miles is the upper limit owners will travel to hunt the area. Any return on land improvement costs would be negated by their limited use of the property.

Finally, Table 16 which looks at the type of ownership by type of manager, reveals that incorporated ownerships are more likely to employ managers than all forms of private ownerships including partnerships. Thirty percent of all incorporated ownerships hired a manager but only 6.6 percent of the private ownerships did so. Twelve percent of all incorporated ownerships hired waterfowl managers while less than four percent of the private ownerships hired them. The difference between corporate and private ownerships with regard to management suggests, if anything, that the incorporated properties are more in need of "contract" assistance in performing specific tasks than privately owned properties. Incorporated ownerships tend to have more acreage and more members, a fact which may encourage the use of contract managers. The scale of corporate operations, in comparison to private, may move owners to maximize the use of their land by securing grazing contracts. The use of contract personnel is seen as a way to increase revenue, as in the case of the livestock manager, and to stabilize declining memberships, as in the case of the waterfowl manager.

Table 16: Type of Ownership by Type of Management

	Private	% of Private	Incorporated	% of Incorporated
Contract Waterfowl	4	3.8	6	1.8
Livestock	0	0	4	7.8
Caretaker	3	2.8	5	9.8
Total	7	6.6	15	29.4

6.0 THE DUCK CLUBS OF THE GRASSLAND WATER DISTRICT

6.1 Membership

The previous sections have addressed property ownership in the Grassland Water District without particular attention to the implied role of the district, namely to provide wintering habitat for waterfowl. The decision to enter into one of the three management schemes--agriculture, waterfowl, or a combination of the two - is often a function of the duck club itself. For that reason a discussion of the duck club seems opportune at this time. Land ownership remains the unit of analysis in this discussion. However, when considering land use it must be remembered that the actors involved in the selection of a land use option are corporally distinct from the category of owners. While the owners of incorporated clubs double as the membership. Many ownerships (both private and corporate) sell or rent memberships to non-owners.

There are two categories of duck club which reflect these differing approaches to membership. The first is the private club and the second the commercial club. The private club is owned by one or more individuals whose intent is motivated by aesthetic or recreational interests. The costs of management and operation come from the ownership (i.e., not from extended forms of ownership such as rentals). Since membership and ownership on the private duck club are inherently synonymous the residency of members matches that of owners identified previously. Membership in the private club requires an initial fee as well as a yearly assessment. For owners the initial fee is the cost of ownership.

Several private clubs have members who are not owners but renters. In these cases owners outnumber renters disproportionally. Renters do not pay the initial membership fee but substitute a yearly assessment which is applied directly to the operating and management expenses of the club. Renters usually share in the many facets of the club's operations and in some cases their long-standing ties with the club has blurred the distinction between owners and members.

6.2 Rental

The commercial club is owned by one or more individuals whose emphasis on blind rentals over personal recreation establishes a new set of management procedures. The number of renters on these clubs always exceeds the number of owners. There are at least seven known commercial clubs operating in the Grassland Water District.

Blind rentals on the commercial club are determined by market demand. The quality of the hunt or numbers of ducks killed on a club contributes to that club's market value. Renters find the limited financial commitment and short contract terms to be an incentive for renting. The opportunity to change clubs in search of better hunting is a privilege of the renter not the owner. Although renters pay market prices for seasonal use of a blind their status varies from club to club. On some clubs renters participate in the system of blind rotation along with the general membership while at others renters are assigned permanent positions apart from the general membership. Commercial clubs are motivated by a rental market to seek methods of improving the quality of the hunt. The use of contract managers and limiting the number of cattle on the property are supplementary effects of this economy.

6.3 Management Priorities

Clubs are further distinguished by their management practices. There are two predominant patterns in this regard. The first was management for waterfowl and the second was management for livestock. The increased need to make the Grassland more productive has created a movement among clubs away from livestock and toward habitat management. The imperative to increase the carrying capacity of the Grassland Water District is driven in part by the realization that the Grassland represents one of the last contiguous tract of natural wetlands in the Central Valley and by research which has uncovered the role of winter habitat in maintaining the Pacific Flyway. Both of these issues have brought about a reduction in cattle grazing. Coincidentally, low beef prices have allowed duck clubs to experiment with habitat management. Property owners who have consistently grazed their land in past years are now able to develop these lands in the absence of cattle contracts. Once they introduce land improvements directed towards the needs of waterfowl they are often hesitant to return their lands to grazing. In addition, the prospect of improving the quality of hunting appears to be a competitive economic force drawing owners away from the cattle market.

Driven by the fragility of the natural resource and by endogenous forms of competition which pit one club against another in achieving the best hunting record, many clubs have opted for a year round system of management which includes pond levelling, the development of water control structures, discing, mowing, the cultivation of native varieties of food, and irrigation. Livestock management interferes with these practices in as much as cattle obstruct land improvement projects, discing, mowing, and irrigation. In addition, cattle have a tendency to damage water control structures, roads, blinds, etcetera, and to eat the same grasses preferred by waterfowl. The young shoots which sprout after summer grazing are an inadequate winter food supply for most waterfowl (geese find them palatable).

The numbers of clubs practicing intensive waterfowl management is increasing. Many clubs have employed contract waterfowl managers towards this end. Others utilize the highly trained specialists available through the U.S. Fish and Wildlife Service and California Department of Fish and Game. At present, approximately 12 clubs have entered into an intensive waterfowl management program. There are many other clubs who currently include one or more components of the waterfowl management system in their yearly work plan. These clubs typically engage club members or owners in performing these tasks.

6.4 Duck Club Characteristics

Specific information was collected from 13 duck clubs in the Grassland Water District regarding the management and operation of the club. Questions were asked as a part of a non-standardized interview conducted with representatives of the duck clubs, individuals from the Grassland Water District, California Department of Fish and Game, U.S. Fish and Wildlife Service, Soil Conservation Service, San Joaquin Valley Drainage Program, and California Waterfowl Association. The intent of these interviews was to establish parameters for a more extensive process of data collection, namely a survey. Questions focused on the types of management practices found in the Grassland Water District, costs of management, water quality, and water quantity. Representatives of the duck clubs were asked specific questions about the number of members, residency of membership, occupations of members, age range, cost of membership, assessed fees, numbers of blinds, cost of blind rentals, attendance figures, and budgeting. The structure of these interviews was plastic and allowed for transition between levels of questioning. Individuals who had specific knowledge of a single club were asked questions about club management, costs of operations, social and demographic characteristics of the membership, and so on. Those at a distance from the club were asked about patterns or trends which might be evident from that perspective.

A rough sketch of the duck club is made possible by synthesizing the results of these interviews. In presenting this material there has been no attempt to standardize the data. The range of responses are those given by respondents themselves.

Acres per Hunter

Range	21.9 to 287.3 acres/ hunter
Average	48.27 acres/ hunter

Blinds (doubles) per Acre

Range	20.0 to 46.3 acres/ blind
Average	30.42 acres/ blind

Age of Membership -- Averages among clubs responding

55, 52, 63, 50, 42

Occupations of Membership

College administrator, realtor, accountant, recreation specialist, painter, fireman, policeman, doctor, lawyer, dentist, insurance salesman, tomato processing administrator, retired plumbing and heating, retired sheet metal, hardware business, donut business, farmer, independent businessman, insurance adjuster, Department of Forestry employee.

Blind Rental Fees

Range	$1,000 to $2,500 per year
Average	$1,542.85 per year

Seven out of the 13 clubs had blind rentals. Six of the 13 were commercial clubs with more blind rentals than owner-used blinds. The ratio of total blinds to rented blinds varied between the commercial clubs in the survey (12/8; 8/6; 30/20; 10/9; 3/2). One club had divided its acreage according to type of user. Three hundred acres was used by the owners and the remaining 139 acres reserved for rental use.

Operating Costs--Averages

Taxes	$7.00/ acre
Water	$3.00/ acre under contract with GWD $3.00/ acre standby charge
Insurance	$1,000/ year
Nominal Maintenance	$1,000/ year
Manager's Salary	Variable, up to $5.00/ acre per year
Fuel, Utilities	Variable, depending on work plan and improvements

Income -- Potential

Oil Leases	$10.00/ acre
Cattle	$5-10.00/ acre
Water Bank	$8-15.00/ acre
Blind Rentals	$800-2,500.00/ double blind

Income -- Potential Continued

Annual Assessments	$600-1,200.00/ year
Bank Interest	Variable
Transfer Fees	Incorporated clubs only
Oil Leases	Income sources in the 1970s, but not presently

Water Needs

Flood Up	Range 1.08 to 1.28 acre foot per acre
Maintenance	Range 0.3 to 0.4 acre foot applied once in November and again in January

The water figures given for flood up and maintenance reflect bare minimum practices. Clubs have been accustomed to ordering 70 percent or less of the quantity required to flood up in anticipation of acquiring additional water from upslope sources as surface runoff or from operational losses along the supply system. Managers interested in providing wintering habitat reported that their needs were closer to 3 acre feet per year. Increased water use for food and brood production was the reason for the higher demand.

6.5 Recreational Use on the Duck Clubs

By common agreement, nearly every club contacted in the Grassland Water District limited itself to two shoot-days per week; Saturdays and Wednesday. Opening weekend was the single exception with both Saturday and Sunday shoot-days. The 1986-87 season allowed for 29 shoot days when the two day per week schedule was applied. Attendance figures for the clubs average 100 percent during opening weekend but typically decline to 40 percent by mid-season. Between 50-60 percent of the membership including rental use hunted each day of the season on the average.

An estimate of the number of hunters using the area was not possible from the data collected. The U.S. Fish and Wildlife Service reports that "an estimate of between 2,500-3,000 hunters per day is not unrealistic for the Grassland Water District".[6] It is not clear from this whether they mean per shoot-day or not. The report goes on to say "quality, as measured by hunter success is very good--with hunters averaging 3.5 birds per hunter per day".[7] Hunter success on the Hollister Club during the 1986-87 waterfowl season was reported at 30.2 kills per hunter per year with 2.9 kills per hunter per day.[8] Statistics for the 1985-86 and 1986-87 season on the Hollister Club are given below.

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[6] "Land Acquisition Ascertainment Report for the West Grasslands, Merced, CA." April 1978, USFWS.

[7] The 3.5 bird per hunter figure reflects a 7 bird bag limit.

Hollister Hunting Records	1985-86	1986-87
Total shooters	878	1,017
Total shoot-days	25 & 3 goose	29
Total ducks	2,334	2,607
White geese	196	60
Dark geese	4	0
Pheasant	34	24
Average duck/hunter	2.66	2.90
Average waterfowl/hunter	2.93	2.97

In addition to waterfowl many users of the Grassland Water District hunt pheasant. With the majority of club members professing an allegiance to waterfowl the actual number of these hunters is unknown. Among those who were known to hunt pheasant were unattached hunters renting blinds. Owners encouraged these individuals to hunt other game in order to reap greater benefits from their rental fees.

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[8] The Hollister Club figures fall under the 5 bird limit laws.

7.0 GOVERNMENT SUPPORT PROGRAMS IN THE GRASSLAND WATER DISTRICT

The Duck Clubs, as previously indicated, rely upon membership levies and dues payments for their income and in some cases from grazing contracts, agriculture production, or blind rentals. For the most part clubs are dependent upon membership dues for the support of the club. With the increasing costs of owning and managing clubs these budgets have proven inadequate for land improvement projects needed to enhance waterfowl production. As a result federal and state agencies have committed funds to the development of the wetlands in the Central Valley. These funds target the duck clubs.

There are three programs currently in effect in the Grassland Water District: The Federal Easement Program, Water Bank, Soil Conservation Service (SCS) Cost-Sharing Program. Each program is a component of a national design which sees the revitalization of waterfowl habitat as its objective.

7.1 Federal Easement Program

The Federal Easement Program, introduced in 1979, buys, in perpetuity, the agricultural development rights of transitional properties, thus securing the land for wildlife habitat and barring its conversion to agriculture. Payment is made in a lump sum upon entry into the program. Most contracts in the GWD to date have been paid at the rate of $300.00 per acre.[9] Money obtained through the Federal Easement Program was deposited into private accounts or applied directly to property improvements.

The Federal Easement Program boundaries in the West Grassland follow the boundaries of the Grassland Resource Conservation District, as shown in Figure 1. The Department of the Interior had paid out a total of $7,337,400 in committing 24,458 acres of the Grassland Water District to the Federal Easement Program at the writing of this report.[10] Their goal is to enroll 48,000 acres into the program. The 24,458

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[9] A few clubs have received payments over $300.00/acre. Determination of the amount to be paid is left to USFWS. real estate appraisers and depend upon several physical features including location, cost and quality of improvements, etc.

[10] These figures are for the Grasslands Water District only. However, the Easement Program encompasses the Grasslands Resource Conservation District, an area slightly larger than the district, in its efforts.

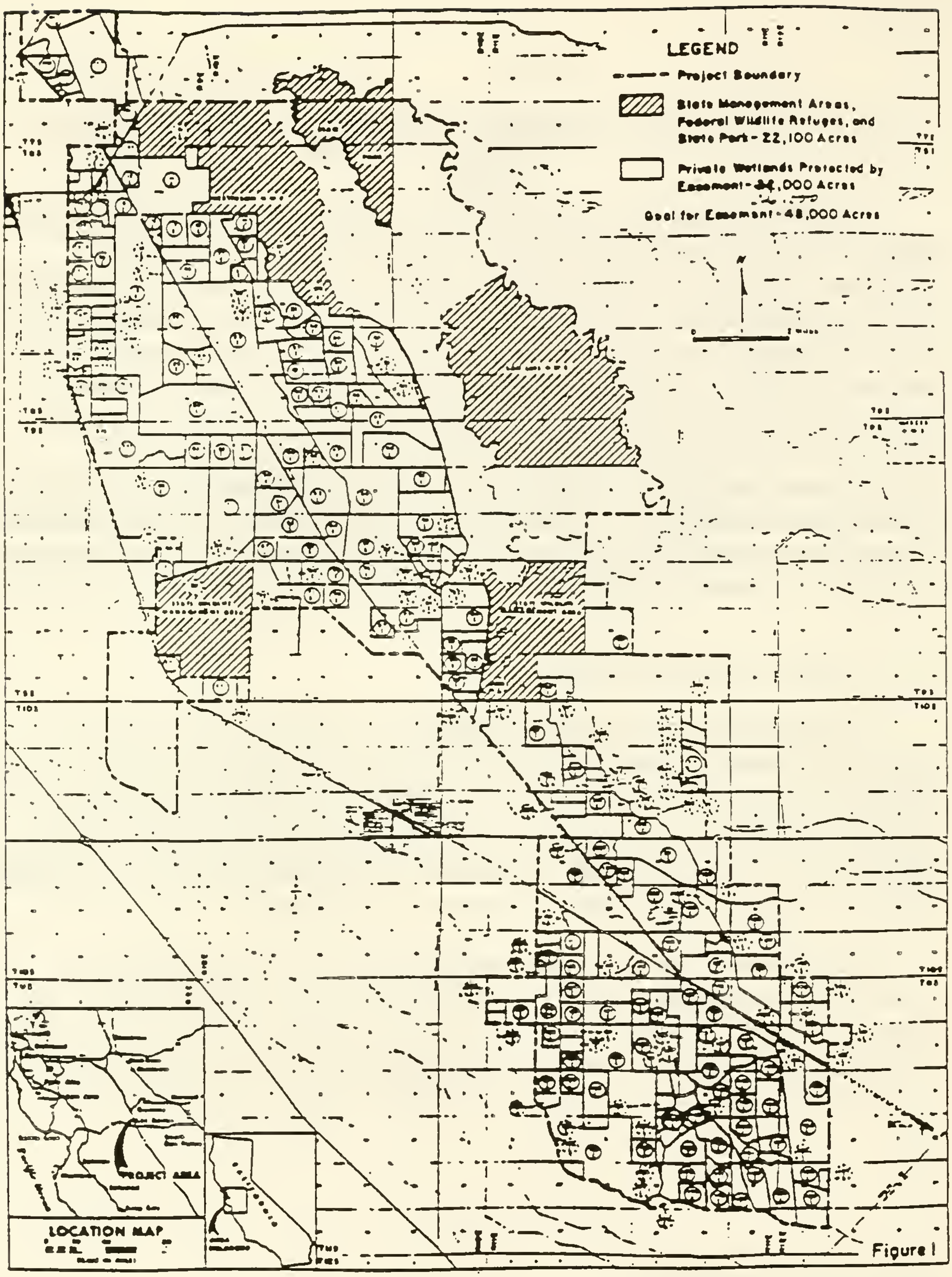
LEGEND
Project Boundary
State Management Areas, Federal Wildlife Refuges, and State Park - 22,100 Acres
Private Wetlands Protected by Easement - [illegible],000 Acres
Goal for Easement - 48,000 Acres
N
LOCATION MAP
PROJECT AREA
Figure I

Figure 1. Boundaries of Federal Easement Program

acres represented 82 ownerships in the Grassland Water District (Table 17). Two owners had entered two clubs each bringing the total number of duck clubs in the program to 84.[11]

Table 17: Federal Easement Program

	Grassland W.D.	N. Grassland	S. Grassland
Owners Entering into an Easement Agreement	82	33	49
Total Acres	24,458	10,912	13,546

Since enrollment in the Easement Program implies a vested interest in waterfowl as a resource, Table 18 presents a comparison between enrollment in the Federal Easement program and the use of contract waterfowl managers to examine the linkage between the two. If the Easement Program attracts waterfowl enthusiasts then one could expect a correlation between participation in the program and the use of contract waterfowl managers. On the other hand, if participation in the program provided only a cash return to ownerships no such relationship would appear.

Table 18: Participation in Easement by Type Management

	Easement Club	Non-easement Club
Waterfowl Managers	8	2
Livestock Managers	1	3

In practice, the overwhelming majority of clubs who had embarked upon a program of waterfowl management had sold their easements to the federal government, thereby affirming their commitment to waterfowl. Many of the clubs who had entered into the Easement Program had been encouraged by contract managers to do so.

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[11] Information on the Federal Easement Program was obtained from the files of the USFWS easement biologist in Los Banos.

7.2 Water Bank

The Water Bank program, directed by the Soil Conservation Service, intends to offset owner costs in providing water, nesting, and feed habitat to wintering waterfowl. Funding for the program is supplied by the Agricultural Stabilization and Conservation Service (ACSC). Water Bank contracts in the grassland area were of two kinds: food production and brood production. The determination as to which type of contract are offered during the year is made by the ASCS at the state level. All 1986 contracts in the GWD were written for brood production.

The process of applying for and receiving funding is similar to many public assistance programs. Owners submit written applications; applicants are reviewed by a select committee composed of wildlife professionals from the U.S. Fish and Wildlife Service, the Department of Fish and Game, and a representative from the SCS; properties are ranked according to their ability to meet the management standards set by the ASCS for food and brood production; and, finally, this ranking is forwarded to the ASCS who enters into a contract with the owner on a "cash available" basis. The term of the Water Bank contract is 10 years with a maximum limit of 500 acres per contract. Owners can hold multiple contracts and, thus, commit in excess of 500 acres to the Water Bank Program. Payments ranged between $8.00 and $15.00 per acre in the Grassland Water District. There are 23 owners currently participating in the Water Bank Program (Table 19). Fifteen of these owners are also members of the Easement Program.[12]

Table 19: ASCS Water Bank Program

	Grassland W.D.	N. Grassland	S. Grassland
Owners Participating in W.B.	23	11	12
Total Acres in W.B.	9,759	5,130	4,629
Total Yearly Payments	$100,780	$52,318	$48,462
Owners Participating in both W.B. and Federal Easement Program	15	6	9

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[12] Information on the ASCS Water Bank program was obtained from SCS files.

7.3 Cost-Sharing

The Cost-Sharing program offered by the ASCS provides owners the opportunity to undertake land development projects on their properties. The cost of such projects is to be matched by the ASCS in an amount not exceeding $3,500.00 per year. Projects supported in this fashion are to be related to soil conservation. Among those projects targeted by the ASCS are: shallow water development, levee construction, new water control structures, and surface drainage ditches. Many owners used the ASCS's assistance to enhance their ability to acquire a Water Bank contract wherein water control is seen to be a prerequisite of both food and brood production.

Eleven owners in the Grassland Water District used Cost-Sharing monies during 1986. Participation in Cost-Sharing proved a good indicator of the owner's commitment to waterfowl management. Seven of the 11 owners using Cost-Sharing monies were also in the Water Bank program. Six of the 11 clubs were in the Water Bank and the Federal Easement Program simultaneously. In reference to ownership, five of the six ownerships receiving Federal Easement, Water Bank, and Cost-Sharing monies were incorporated. The propensity of incorporated ownerships seeking alternative sources of income leads one to speculate on the relationship between type of ownership and the ability and inclination to secure other monies used in property management. The management of incorporated clubs may facilitate entry into these programs because of the use of contract managers who support such programs in their efforts to improve the waterfowl habitat.

8.0 THE PUBLIC REFUGE SYSTEM IN THE GRASSLAND

In the area identified in this study as the Grassland there are, in addition to the Grassland Water District, federal and state managed waterfowl habitats. This area includes the Los Banos Wildlife Area, Volta Wildlife Area, San Luis National Wildlife Refuge, Kesterson Wildlife Refuge. A fifth, the Grassland State Park, was not open for public access at the time of writing. Figure 2 illustrates the location of these areas.

In this section we wish to profile the patterns of recreational use (i.e., who uses them, when, and for what purpose, the social and demographic character of users and the intensity of use). The difference between users of the refuge system and those of the private duck clubs found in the GWD will become clear in this analysis.

8.1 Patterns of Recreational Use on Public Use Areas

Taking as the boundaries of the study area the Grassland Resource Conservation District and hinterlands from Highway 140 north to South Dos Palos and the San Joaquin River in the east to Highway 33 in the west, there are four public use areas within this region. The objectives behind the development of these areas are (1) to provide suitable habitat for wintering waterfowl, (2) to minimize crop depredation by migratory waterfowl by supplying food and resting areas, and, (3) to provide a public area for waterfowl hunting.

Los Banos Wildlife Area

As shown in Figure 3, the Los Banos Wildlife Area is about four miles northwest of Los Banos, in the San Joaquin River flood plain in western Merced County. Originally a state game preserve, the Los Banos Wildlife Area was the first in a series of waterfowl refuges established by the Department of Fish and Game in the 1930s. The property, purchased in 1929, was originally 3,000 acres but was enlarged to its present 3,208 acres.

The original concept of refuge management provided habitat and protection for a minimum number of waterfowl during the winter season. The refuge's water rights, however, did not provide sufficient summer water for nesting waterfowl and other marsh-associated wildlife. The use of drainage water, revision of water rights, drilling of deep wells, and the purchasing of water from the Grassland Water District now allows the refuge to provide winter as well as summer habitat. In response to concern with water quality, the Los Banos Wildlife Area limited the use of drainage water on the site. Construction of a water conveyance channel in 1986 provided managers the capacity to separate drainage water from high quality fresh water upon entry into the Wildlife Area.

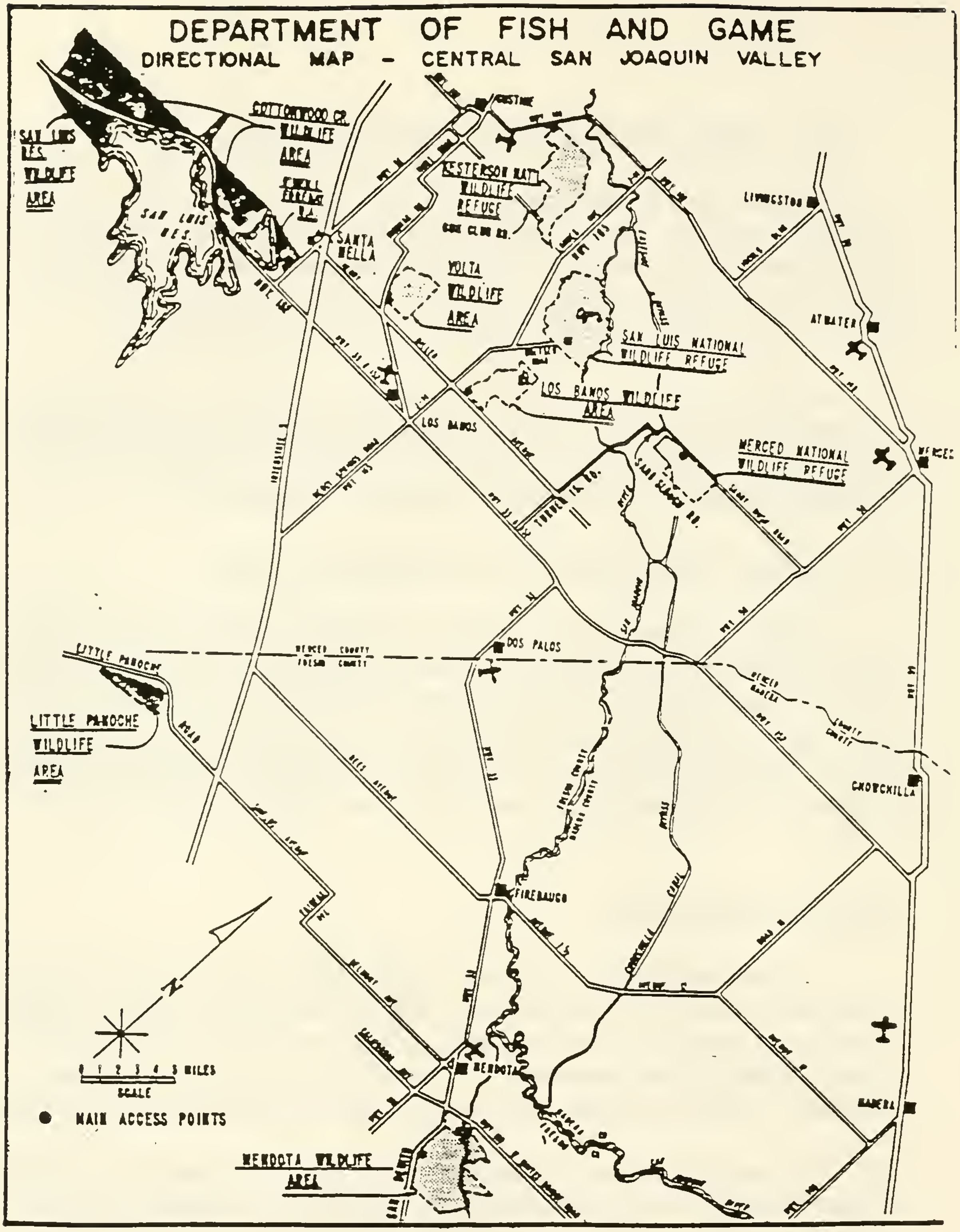
DEPARTMENT OF FISH AND GAME
DIRECTIONAL MAP - CENTRAL SAN JOAQUIN VALLEY
SAN LUIS RES. WILDLIFE AREA
SAN LUIS RES.
COTTONWOOD CR. WILDLIFE AREA
SANTA NELLA
KESTERSON NAT'L WILDLIFE REFUGE
GUN CLUB RD.
VOLTA WILDLIFE AREA
SAN LUIS NATIONAL WILDLIFE REFUGE
LOS BANOS WILDLIFE AREA
LOS BANOS
LIVINGSTON
ATWATER
MERCED NATIONAL WILDLIFE REFUGE
MERCED
DOS PALOS
LITTLE PANOCHE WILDLIFE AREA
CHOWCHILLA
FIREBAUGH
MENDOTA
MADERA
MENDOTA WILDLIFE AREA
N
0 1 2 3 4 5 MILES
SCALE
● MAIN ACCESS POINTS

Figure 2. Location of Districts and Habitats in Study Area

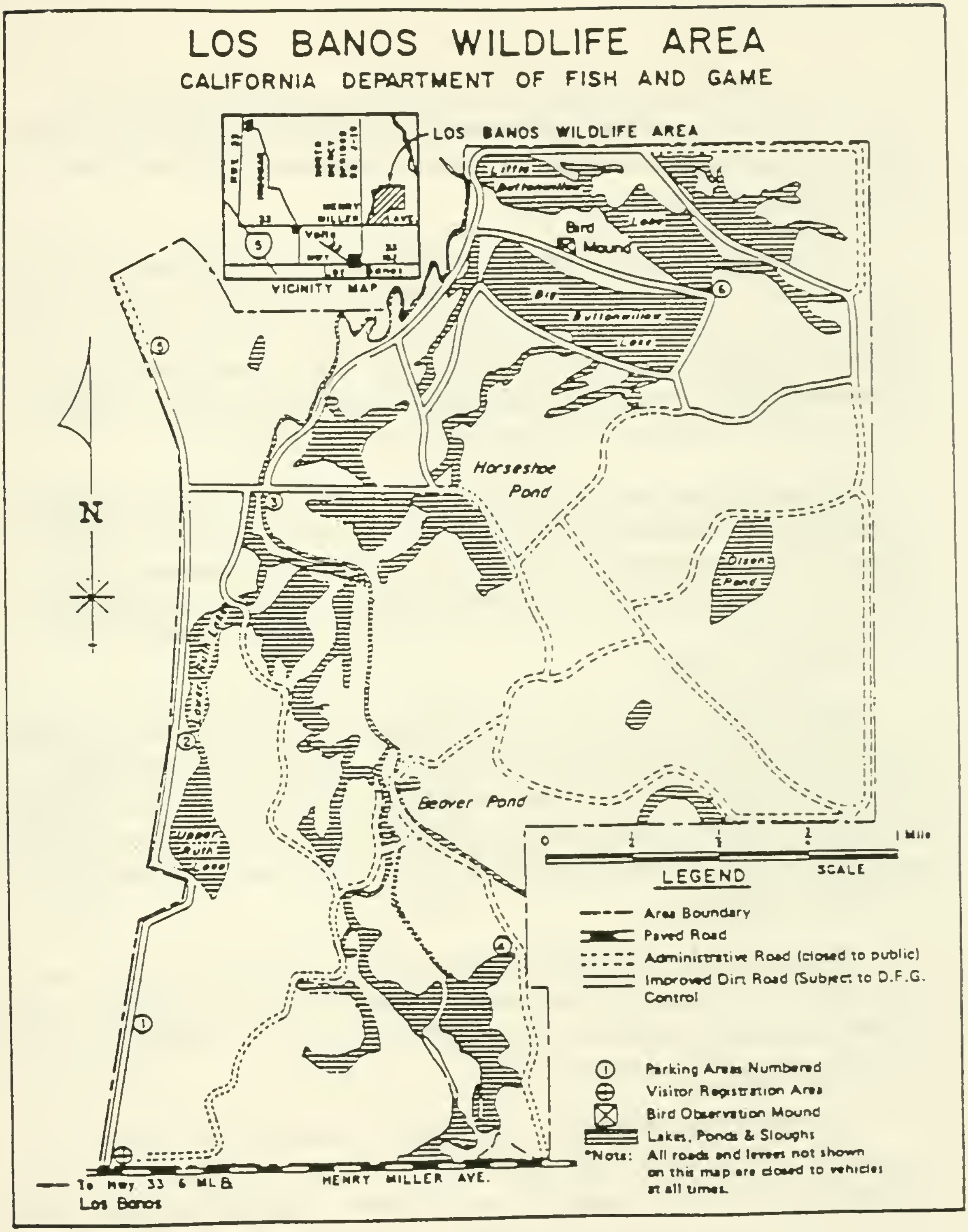

Figure 3. Los Banos Wildlife Area

During 1987 summer and winter water for the Los Banos Wildlife Area was supplied on contract by the Grassland Water District. Additional water was provided by the Bureau of Reclamation as mitigation water from the closure of portions of the Kesterson Wildlife Refuge.

In addition to the three objectives stated above, state owned refuges recognize a fourth objective: the enhancement and recreational use of all wetlands wildlife. This multiple-use policy now permits all wildlife-oriented recreational activities which are compatible with the primary objectives of the area. Activities including hunting for raccoons, rabbits and pheasants, fishing, frogging, camping, picnicking, and nature studies can be found on both the Los Banos and Volta Wildlife Areas.

Funding for both state owned refuges comes from Pittman-Robertson funds and the State Game Preservation Fund. Pittman-Robertson funds are derived from the federal tax on sporting arms and ammunition and the State Fish and Game Preservation Fund is principally comprised of monies derived from the sale of hunting and fishing licenses.

Schedule of Use

As shown in Table 20, the area is open to the general public 24 hours a day, seven days a week from the middle of January (first day following the close of waterfowl season) through September 30. Waterfowl may be hunted on Saturday, Sunday, and Wednesday from mid-October through mid-January. A fee of $10.00 is charged to all adult hunters per day (other fee schedules are available and are noted below). There were a total of 35 shoot days in the 1986-87 season.

Pheasant hunting is permitted, during the season, on Saturdays, Sundays, and Wednesday, and in combination with waterfowl hunting. On the first Monday, Tuesday, Thursday, and Friday of the season, hunting is for pheasant only. Pheasant season runs early November through early December.

Jackrabbit hunting is permitted from the end of waterfowl season through September 30. Cottontail rabbit hunting and raccoon hunting is permitted during the legal season except from October 1 through waterfowl season. Other activities include camping, dog training, fishing, frogging, bird watching, and sightseeing. Fishing includes bow fishing for carp.

Table 20: Schedule of Use on Los Banos, Volta, San Luis, Kesterson Refuges

Items	Seasons	Availability on Public Areas
BIRDS		
Duck	Oct. - Jan.	Oct. - Jan.
Geese	Nov. - Jan.	Nov. - Jan.
Coots	Oct. - Jan.	Oct. - Jan.
Pheasants	November	November
RABBITS		
Cottontails	July - Jan.	July - Sept.*[13]
Jackrabbit	All year	Jan. - Sept.*
SQUIRREL		
Tree Squirrel	Sept. - Jan.	N/A
California Ground Squirrel	All year	Jan. - Sept.*
FISH		
Carp	All year	Jan. - Sept.
Blackfish	All year	Jan. - Sept.
Catfish	All year	Jan. - Sept.
Bullhead	All year	Jan. - Sept.
Shad	All year	Jan. - Sept.
Bass	All year	Jan. - Sept.
Striped Bass	All year	Jan. - Sept.
Sunfish	All year	Jan. - Sept.
Crappie	All year	Jan. - Sept.
FROGS	April - Nov.	April - Sept.
BIRD WATCHING	All year	Jan. - Sept.
SIGHTSEEING	All year	Jan. - Sept.

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[13] *This type of hunting is not permitted on the San Luis or Kesterson National Wildlife Refuges.

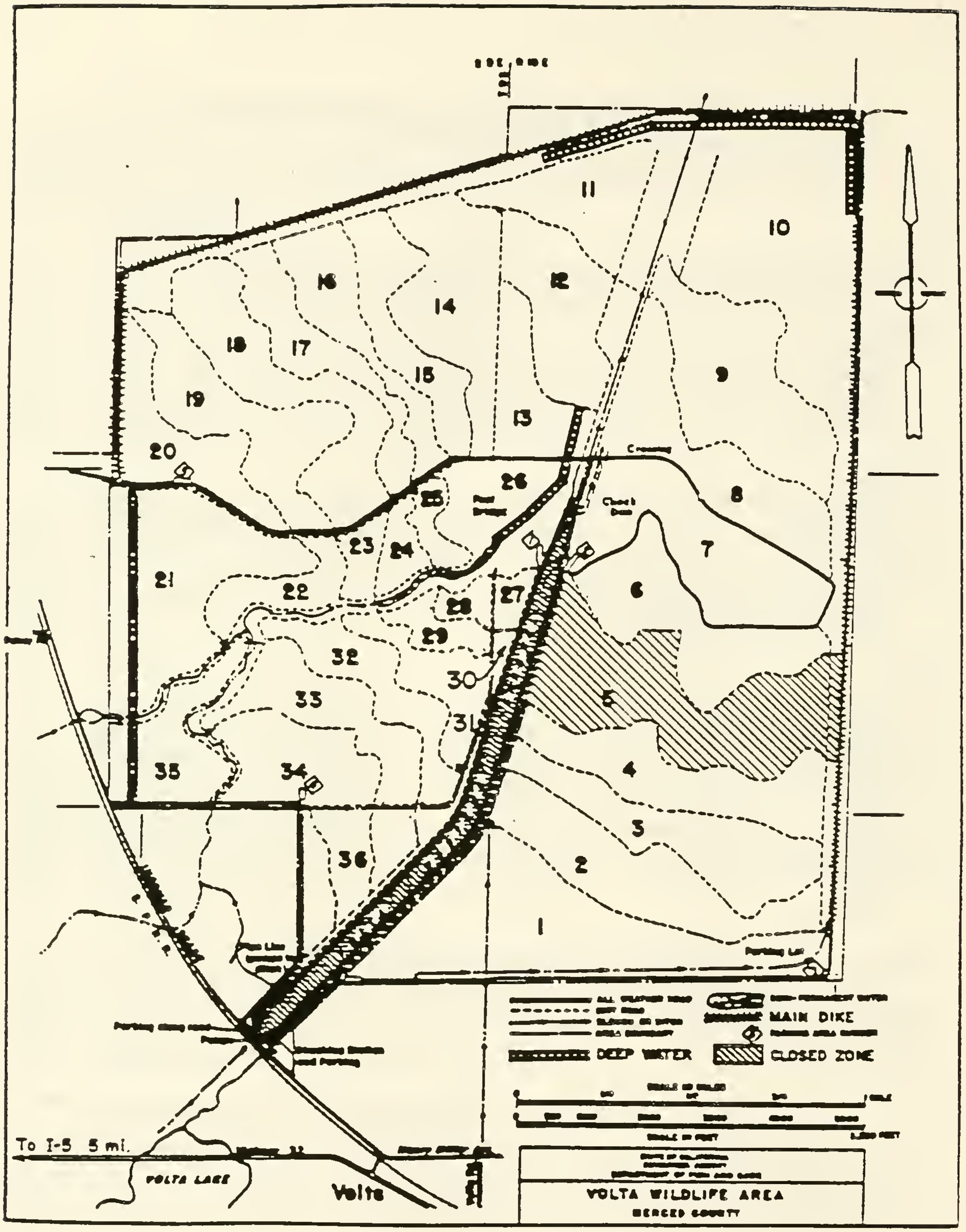

Figure 4. Volta Wildlife Area

Volta Wildlife Area

The Volta Wildlife Area, shown in Figure 4, is located approximately 5 miles northwest of Los Banos on Ingomar Road. It is owned by the U.S. Bureau of Reclamation and leased to the California Department of Fish and Game. The primary recreational use on the area is waterfowl hunting and fishing. Volta Wildlife Area, like Los Banos, operates under a public-oriented mandate. Along with providing wildlife habitat, they share in a commitment to enhance the recreational use of all wetland wildlife.

Volta is composed of 2,750 acres of ponds and marsh habitat. Access to the area is by foot only. For general use the area is open between the middle of January (the first day following the close of waterfowl season) and September 30.

The Volta Wildlife Area receives the majority of its water supply from the Delta-Mendota Canal and the O'Neill Forebay through the San Luis Spillway Ditch. This water is imported from the Delta pumping station at Tracy.

Schedule of Use

Waterfowl hunting is permitted, during the season (October - January) on Saturday, Sunday, and Wednesday (Table 20). Jackrabbit hunting is permitted from the end of waterfowl season through September 30. Cottontail hunting is permitted during the legal season except from October 1 through waterfowl season.

On both the Volta and Los Banos Wildlife Areas each hunter is limited to 25 shotgun shells when in the field per shoot day for waterfowl hunting. There is no camping in either area during waterfowl season.

Other activities on the Volta Wildlife Area include frogging and fishing on a year-round basis. However, portions of the area are closed to each during the waterfowl season (February 1 to September 30). Bird watching and sightseeing are permitted between the end of waterfowl season and September 30.

Kesterson and San Luis National Wildlife Refuges

The Kesterson National Wildlife Refuge is composed of 5,900 acres of wetland habitat while San Luis is 7,400 acres. The program of wildlife management at both sites is developed, maintained, and managed by the U.S. Fish and Wildlife Service. As federally operated areas Kesterson and San Luis Wildlife Refuges exhibit more restrictive patterns of use reflecting U.S. Fish and Wildlife's commitment to wildlife conservation as their primary objective. The ratio of waterfowl hunter per acre on federal areas, for example, is well below that recorded on the State area. During the 1986-87 waterfowl season Los

Banos and Volta had a ratio of nearly 0.85 acre per hunter while San Luis and Kesterson committed 2.7 and 5.8 acres, respectively, to each waterfowl hunter. Facilities for camping and picnicking cannot be found on either Kesterson or San Luis.

Figures 5 and 6 show the Kesterson and San Luis Wildlife Refuges, which lie along the San Joaquin River flood plain. Kesterson is at the lowest end of the Grassland Water District conveyance system while San Luis at the lowest end of the San Luis Canal Company system. Water for the Kesterson National Wildlife Refuge is delivered through San Luis Canal and Freemont Canal by Central California Irrigation District. Mud Slough drains through the Kesterson Wildlife Refuge picking up water from the Santa Fe Ditch and Eagle Ditch on its way through the Grassland Water District. The San Luis Wildlife Refuge receives water from the San Luis Canal Company through upper Salt Slough.

Schedule of Use

Both the Kesterson and San Luis National Wildlife Refuges are operated as a cooperative effort by the California Department of Fish and Game and the U.S. Fish and Wildlife Service. As a result the patterns of use correspond to those found on the state operated areas, Los Banos and Volta.

Waterfowl hunting is permitted, in season, on Saturday, Sunday, and Wednesday. Waterfowl hunters are required to have state and federal duck stamps and a valid California hunting license. Open season begins in mid-October and continues until mid-September. There were 35 shoot days in the 1986-87 season. Pheasant hunting runs concurrently with waterfowl through the month of November and is permitted Saturday, Sunday, and Wednesday and on the first Monday, Tuesday, Thursday, and Friday of the season for pheasant only. Cottontail and jackrabbit hunting is not permitted on either refuge. There is no provision for camping on either the Kesterson or San Luis National Wildlife Refuges.

Fishing and frogging are permitted in season along the Salt Slough portion of the San Luis National Wildlife Refuge while Kesterson is closed to fishing and hunting.

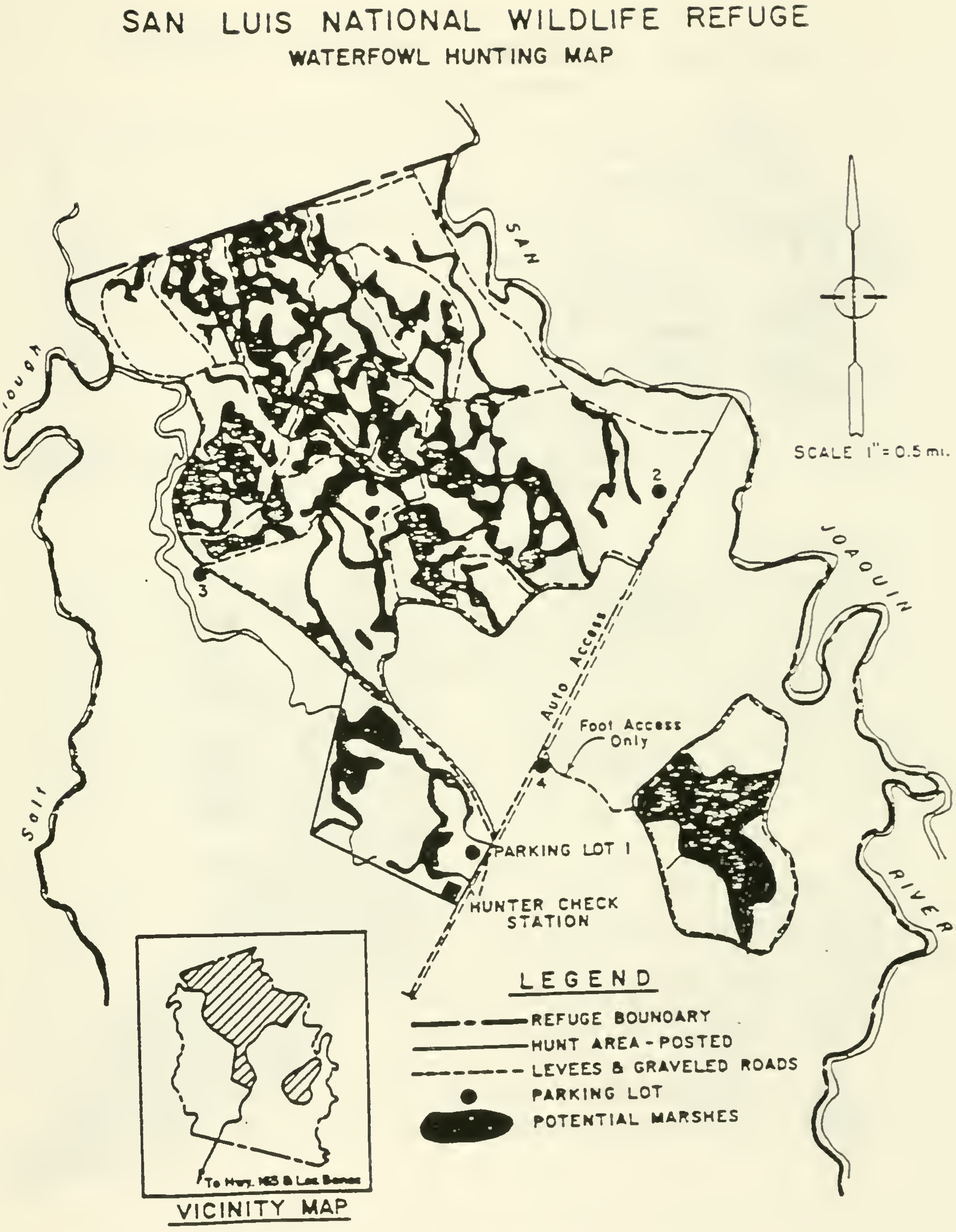

Figure 5. San Luis National Wildlife Refuge

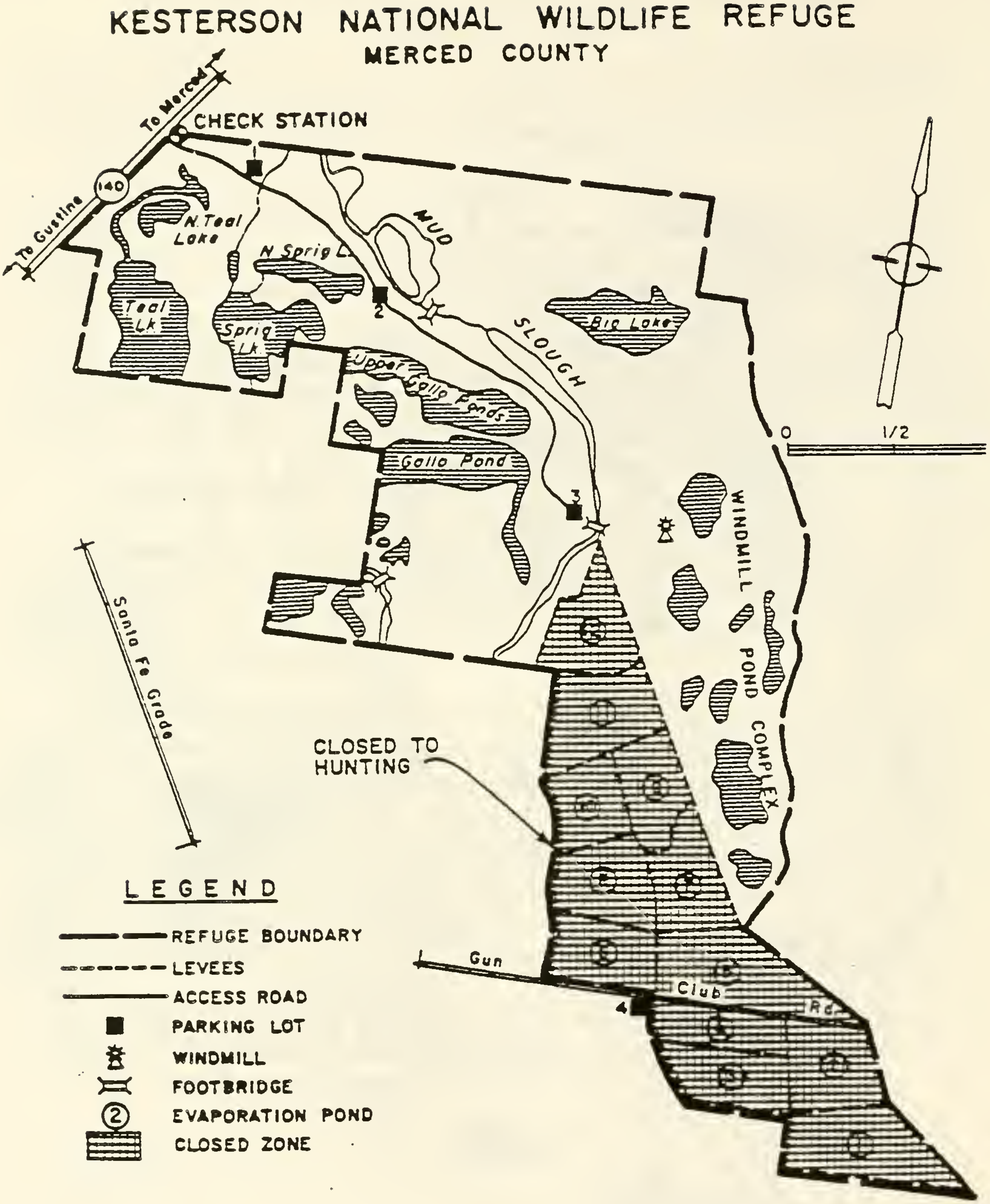

Figure 6. Kesterson National Wildlife Refuge

8.2 Social and Demographic Characteristics of Users of Public Areas

The State of California registered 90,208 duck stamp sales during the 1986-87 waterfowl season.[14] Of those individuals hunting in Merced County the majority used the public refuge system managed by State and Federal wildlife agencies. The system provided by the refuge system allowed hunters to participate in a payment for service arrangement whereby hunters paid to hunt. User fees on the refuge was $10.00 per visit. Two day permits were available from license dealers for $15.00. Season permits, which entitled the bearer to hunt any of the four sites considered in this study, sold for $75.00. The season permit allowed hunters to hunt at public refuges adjacent to the Grassland Water District where member assessments averaged $1,000.00 per season. The refuges, offering lower costs and greater flexibility, were preferred by young hunters.

Hunters using the four areas included within the study area--Los Banos Wildlife Area, Volta Wildlife Area, Kesterson National Wildlife Refuge, and San Luis National Wildlife Refuge--come from a variety of urban, suburban, and rural communities throughout California with the majority coming from Monterey, San Jose, Gilroy, Salinas, or Santa Cruz. California Fish and Game employees reported only 15 percent of the hunters using the four public areas in the study area come from communities within the drainage area itself. The eastern-most refuges, San Luis and Kesterson, drew local hunters from Madera, Merced, and Turlock while individuals from Los Banos, Santa Nella, and Dos Palos were said to hunt the Los Banos or Volta Wildlife Area.

Social and economic characteristics of hunters using the four public areas were derived from existing data sources including two user surveys (1974 and 1975) conducted by Michael Phillips and a hunter survey at Los Banos Wildlife Area. In comparing the space versus blind implementation system, Phillips collected population and income figures for users at the San Luis and Merced National Wildlife Refuges. The Los Banos hunter survey conducted in 1979 included information on hunter residency, hunting patterns, income, family size, social-psychological motivations of hunters and suggested improvements for the refuge area. Data from these studies have been synthesized so as to provide some representation of the typical unattached waterfowl hunter using the refuge.

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[14] Merced County sold 1,318 duck stamps. The difference between this figure and the estimated number of hunters using the area is further evidence of the fact that most hunters reside outside of the Grasslands area. Information on duck stamp sales provided by the California Department of Fish and Game, License and Revenue Branch, Sacramento, CA.

The San Luis National Wildlife Refuge Hunter Survey

Combining data from the 1974 and 1975 surveys at the San Luis National Wildlife Refuge (NWR) resulted in a sample size of 1,611 individuals: 1,596 were males (99 percent), 15 were females (1 percent). The age breakdown indicated the majority of users to be within the 19 to 39 year range (Table 21). This group was three times as large as the next age category.

Information on the distances travelled by hunters, shown in Table 22, indicated that nearly 7 out of 10 hunters travelled 75 miles or more to hunt the refuges. Less than three (2.6) out of every ten hunters travelled between 30 and 75 miles to hunt. Size of the community to which hunters claimed residency varied from rural towns with populations less than 1,000 to cities with more than 250,000 people. More than three-quarters of the hunters came from three community sizes; 10,000 - 50,000; 50,000 - 125,000; and more than 250,000. Since 62 percent of the hunters live 75 to 150 miles from the San Luis NWR, the information on community size allows us to guess at the residency of hunters using the San Luis NWR.[15]

Table 21: Distribution of Age in the Phillips Study

Age	Sample	Percent
16-18	109	7
19-39	1,085	69
40-59	323	20
60 or over	57	4
Total	1,574	100

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[15] The following towns might be suggested as hunter residences: San Francisco, Menlo Park, Atherton, Palo Alto, San Leandro, Cupertino, Pleasanton, Danville, Santa Clara, Hayward, Salinas, Santa Cruz, San Jose, San Bruno, Oakland, and Los Gatos.

Table 22: Distance Traveled by Hunters in the Phillips Study

Miles	Sample	Percent
0-15	23	1
15-30	61	4
30-75	421	26
75-150	986	62
>150	109	7
Total	1,600	100

Table 23 shows income levels of the hunters included in the survey. All income figures have been translated into 1987 dollars for interpretation.[16] Income levels for the survey population were not clustered, but varied from less than $5,000 to more than $20,000. Sixty percent of the hunters using the refuge indicated earnings of between $20,372 and $40,744 in 1987 dollars.

Table 23: Income Levels of Hunters in the Phillips Study

Income (1975 $s)	1987 $s	Sample	Percent
<$5,000	<$10,186	192	12
5,000 - 8,000	10,186 - 16,297	112	7
8,000 - 10,000	16,297 - 20,372	140	9
10,000 - 13,000	20,372 - 26,484	318	20
13,000 - 15,000	26,484 - 30,558	286	18
15,000 - 20,000	30,558 - 40,744	331	21
>20,000	>40,744	208	13
Total		1,587	100

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[16] 1987 $'s have been calculated using the Consumer Price Index. 1975 $'s have been altered to reflect proportional changes measured by this index.

When asked if they would be interested in paying additional money for services and amenities such as decoys, blinds, and less interference from other hunters, 1,134 hunters responded "yes", 232 answered "no." They were then asked how much they would be willing to pay. The categories of increase ranged from $1.00 to more than $5.00 per day (1975 $s). The distribution of these responses is shown in Table 24.

Table 24: Fee Increases Suggested by Hunters in the Phillips Study

Fee Increase (1975 $s)	1987 $s	Sample	Percent
1.00 - 2.00	2.04 - 4.08	200	19
2.50 - 3.50	5.09 - 7.13	303	28
4.00 - 5.00	8.15 - 10.19	293	27
>5.00	>10.19	275	26
Total		1,071	100

Most unattached hunters choose not to join private clubs because of the high membership costs. Nonetheless hunters were willing to pay more than the required user fees in search of a good "hunt." Respondents indicated a willingness to pay up to $10.00 or more per visit to improve the facilities and procedures of refuge hunting. Including the $10.00 user fee charged hunters on the refuge a hunter who paid an additional $10.00 for these privileges would spend approximately $700.00 to hunt every day of the season. This figure is still below the $1,000.00 average members on the private club are assessed yearly. Unattached hunters appeared to be conscious of this price difference choosing to hunt the refuge because of the lower costs.

Hunters reported that they hunted between one and twelve hours per hunt, three to six hours being the most common period identified by respondents. Given the distances covered by hunters to reach the area it is not unexpected to find them staying eight hours or more.

The Los Banos Wildlife Area Hunter Survey

The Los Banos Hunter Survey paints a similar picture of recreational use. The sample size was 857. A gender breakdown of respondents was not included in the data.

Table 25: Hours Reported Hunting in the Phillips Study

Hours	Sample	Percent
1 - 2	56	4
3	197	12
4	446	28
5	341	22
6	364	23
7 - 8	166	10
9 - 10	19	1
11 - 12	4	<1
Total	1,593	100

Table 26 shows the residency of hunters using the Los Banos Wildlife Area, listed according to frequency and percentage of total responses (adjusted for missing cases). The Los Banos hunters were concentrated in the same counties as those using the San Luis NWR.

Distance travelled by hunters to the Los Banos Wildlife Area, shown in Table 27, suggest a slightly different pattern than similar data for the San Luis hunters. While 62 percent of the San Luis sample travelled 75 to 150 miles, approximately 37 percent of the Los Banos sample travelled this distance. About 48 percent of the Los Banos sample group travelled 40 to 50 miles. Seventy-five percent of the private duck club hunters traveled between 50 and 200 miles to hunt in the grassland.

The income range of the sample group is given in Table 28. Equivalent values for 1987 dollars are included. Over 50 percent of those hunters using the public refuges were found to earn between $18,000 and $54,000, in 1987 $s. As shown in Table 29, the majority indicated that they were hunting duck or the combination of duck and goose.

Total hours committed to hunting on the Los Banos Wildlife Area by the hunters in this sample approached those given by the San Luis hunters. As shown in Table 30, 39 percent of the hunters reported staying eight hours at the wildlife area.

Table 26: Residency of Hunters in the Los Banos Hunter Survey

County	Frequency	Adjusted Percent
Santa Clara	327	40
Alameda	88	11
San Mateo	48	8
Monterey	60	7
Santa Cruz	40	5
Merced	30	4
Contra Costa	22	3
Fresno	25	3
Los Angeles	27	3
San Joaquin	26	3
Stanislaus	24	4

The income range of the sample group is given in Table 28. Equivalent values for 1987 dollars are included. Over 50 percent of those hunters using the public refuges were found to earn between $18,000 and $54,000, in 1987 $s. As shown in Table 29, the majority indicated that they were hunting duck or the combination of duck and goose.

Total hours committed to hunting on the Los Banos Wildlife Area by the hunters in this sample approached those given by the San Luis hunters. As shown in Table 30, 39 percent of the hunters reported staying eight hours at the wildlife area.

The fact that 92 percent of the hunters stayed 12 hours or less supports the San Luis survey which claimed 100 percent of the hunters left within 12 hours of arrival. A look at "total days spent hunting" in Table 31 suggests that a measurable few do return for a second day of hunting.

Table 27: Distance Traveled by Hunters in the Los Banos Hunter Survey

Distance Travelled (miles)	Frequency	Adjusted Percent	Cumulative Percent
0	7	1	1
40-49	394	48	49
50-59	24	3	52
60-69	5	1	53
70-89	25	3	56
90-99	5	1	57
100-109	2	<1	57
110-119	117	14	71
120-129	83	10	81
130-139	69	8	89
140-149	6	1	90
150-199	37	4	94
200-300	35	4	98

Table 28: Income Levels of Hunters in the Los Banos Hunter Survey

Income				Cumulative
1977 $s	Adjusted 1987 $s	Frequency	Percent	Percent
$0 - 4,999	$0 - 9,045	102	13.4	13.4
5,000-9,999	9,046-18,091	94	12.4	25.8
10,000-14,999	18,093-27,137	157	20.7	46.5
15,000-19,999	27,139-36,184	159	20.9	67.4
20,000-24,999	36,186-45,231	117	15.4	82.8
25,000-29,999	45,233-54,279	69	9.1	91.9
30,000-34,999	54,280-63,324	35	4.6	96.5
35,000-39,999	63,326-72,370	9	1.2	97.7
40,000-over	72,370-over	18	2.3	100.0
Unknown		97		

Table 29: Preferences of Hunters in the Los Banos Hunter Survey

Type of game hunted	Frequency	Relative Percent	Adjusted Percent
Duck	465	54.3	55.1
Goose	46	5.4	5.1
Pheasant	48	5.6	5.7
Snipe	4	0.5	0.5
Duck, Goose	213	24.9	25.2
Duck, Goose, Pheasant	23	2.7	2.8
Duck, Snipe	9	1.1	1.1
Duck, Pheasant	35	4.1	4.1
Goose, Pheasant	1	0.1	0.1
Unknown	13	1.5	

Table 30: Hours Reported Hunting by Hunters in the Los Banos Hunter Survey

Hunting Hours	Frequency	Relative Percent	Adjusted Percent
0	3	0	0
1	1	0	0
2	10	1	1
3	13	2	3
4	79	11	14
5	63	9	23
6	92	12	35
7	22	3	38
8	288	39	77
9	8	1	78
10	63	9	87
11	11	1	88
12	28	4	92

Table 31: Days Reported Hunting by Hunters in the Los Banos Hunter Survey

Days Hunting	Frequency	Relative Percent	Adjusted Percent
1	73.4	87.4	87.4
2	8.9	10.6	98.0
3	0.4	0.4	98.4
4	0.6	0.7	99.1

Among those hunters remaining more than one night it was found that 51 percent stayed in their vehicles including campers, while less than 2 percent sought hotel accommodations. Another 4 percent stayed with friends in the area. Those using the Los Banos Wildlife Area may have favored one day visits because the hunting schedule paired only Saturday and Sunday as consecutive shoot-days or because the trip home was not too great a burden.

Forty-three percent of the hunters surveyed reported hunting the Los Banos Wildlife Area before the 1979 season. When asked how many times they had hunted the area during the 1976-77 season, twelve percent answered one time, nine percent answered two times, and six percent answered three times. Ninety percent of all respondents fell within the category of having hunted the Los Banos Wildlife Area five times or fewer during the 1976-77 season.

The data from both surveys gives some outline to the unattached hunter found in the Grassland area. When compared to the private club hunter two important features of the unattached hunter become apparent. First, the average unattached hunter was younger than most club hunters. Club hunters averaged 55 years or more for many of the clubs surveyed. In contrast, more than 75 percent of the hunters using the San Luis NWR were 39 years or younger. Second, the income levels of unattached hunters tend to be lower than club hunters. This is intuitive given the high membership costs on the private club, which select for participants with high incomes. Department of Fish and Game personnel suggested that the public use areas were more attractive to young hunters entering the sport because the cost of hunting the public area was lower than the private club.

There have been numerous changes in waterfowl hunting in the years since these surveys were conducted. Both the bag limit and hunting season have been reduced while the number of shells a hunter can take into the field has dropped form 50 to 25. The cost of the duck stamps and user fees have increased almost every year since this time. These changes, not unexpectedly, affect individuals' decisions to hunt and are factors in determining who hunts and who doesn't. If unattached hunters currently differ from the picture drawn by these surveys, it is expected that they will differ on attributes affected by these changes.

Recreational Use Statistics from Public Areas in the Grasslands

Reports from State and Federal field staff on users indicates that the overall patterns of use remains constant while the number of users continues to drop. Most notably, user numbers on the refuges for all types of recreational use have dropped since the publication of health warning notices in State hunting and fishing regulations.[17]

The Waterfowl Hunting Season Report from the State of California Department of Fish and Game for Los Banos, Volta, San Luis, and Kesterson document the decline in user numbers. Looking at the past four years the total number of hunters at the Los Banos Wildlife Area dropped from 3,447 in 1982-83 to 2,631 in 1986-87; for San Luis, this same period shows a decline from 3,689 to 2,686 hunters; Kesterson shows a drop from 2,318 to 1,011 hunters; and the number of hunters at Volta dropped from 3,951 to 3,172. Volta posted a marginal comeback climbing from a low of 2,629 in 1984-85. Department of Fish and Game Waterfowl Hunting Season Reports for each area are included in the Appendix.

The total number of hunters, hunt days, and the number of duck, geese, and coots killed in the 1986-87 season on the Los Banos Wildlife Area, the Volta Wildlife Area, the Kesterson National Wildlife Refuge, and the San Luis National Wildlife Refuge are shown in Table 32.

Table 32: Waterfowl Kills on Refuges in the West Grassland

	LBWA	VWA	KNWR	SLNWR
Total Acreage	3,208	2,750	5,900	7,400
Total Hunters	2,631	3,172	1,011	2,686
Hunt Days	35	35	35	35
Ducks Killed	3,626	7,126	2,052	4,912
Geese Killed	9	3	15	2
Coots Killed	93	1,037	0	67
Total Waterfowl	3,815	8,166	2,067	4,991
Waterfowl/Hunter	1.45	2.57	2.04	1.91

These same records document total kills for other species as well. For the three seasons between 1984 and 1987 the number of Pheasant hunters, Junior hunters (hunters under the age of 16 years), Non-shooters, and Bird-watchers are given in Table 33 for Los Banos Wildlife Area only.

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[17] Personal communications with California Fish and Game field staff, Los Banos, CA.

Table 33: Hunting Record for the Los Banos Wildlife Area
1984-87

	1984-85	1985-86	1986-87
Waterfowl Hunters	3000	2940	2631
Pheasant Hunters	266	154	145
Total Hunters	3266	3094	2776
Junior Hunters	182	163	182
Non-shooters	111	112	94
Bird-watchers	84	--	43
Pheasants Killed	97	50	78
Snipe Killed	86	106	148

For Kesterson, San Luis, and Volta figures for pheasant and Junior hunters are available for the 1986-87 season only. They are shown in Table 34. As seen in this table, Junior hunters accounted for about 5 percent of the waterfowl hunters, except at Kesterson they accounted for about 10 percent.

Table 34: Pheasant and Snipe Kills on Kesterson, San Luis, and Volta 1986-87

	Kesterson NWR	San Luis NWR	Volta WA
Total Waterfowl Hunters	1011	2686	3172
Adult Hunters	903	2536	2878
Junior Hunters	108	150	165
Pheasants Killed	0	51	85
Snipe Killed	0	32	189

APPENDIX

1. California Department of Fish and Game - Summary of Hunting Use 1986-87.
2. California Department of Fish and Game - Waterfowl Results, 1986-87
3. California Department of Fish and Game - Waterfowl Hunting Season Report --San Luis National Wildlife Refuge
4. California Department of Fish and Game - Waterfowl Hunting Season Report--Kesterson National Wildlife Refuge
5. California Department of Fish and Game - Waterfowl Hunting Season Report--Volta Wildlife Area
6. California Department of Fish and Game - Waterfowl Hunting Season Report--Los Banos Wildlife Area

TABLE 8
SUMMARY OF HUNTING USE
1986-87

SPECIES HUNTED	Los Banos	Volta	Cottonwood Creek	O'Neill Forebay	Little Panoche Reservoir	San Luis Reservoir	Total
Waterfowl	1571	3417		171	207		5366
Waterfowl & Pheasant	976						976
Pheasant	145			849			994
Dove	492		20	375	186	46	1119
Quail			280			60	340
Turkey			200			150	350
Deer			1908			502	2410
Pig			53				53
Small Game	916	1426	330	275	600	380	3927
	4100	4843	2791	1670	993	1138	15535

TABLE 9
TOTAL ESTIMATED PUBLIC USE - ALL ACTIVITIES

Activity	Los Banos	Volta	Cottonwood Creek	O'Neill Forebay	Little Panoche Reservoir	San Luis Reservoir	Total
Hunting	4100	4843	2791	1670	993	1138	15535
Non-Hunting	16356	1426	995	1150	2527	380	22834
Total	20456	6269	3786	2820	3520	1518	38369

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1986-87 WATERFOWL RESULTS

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HUNTER TOTALS
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Area	Scheduled Shooting Capacity	Number of Hunters	Number of Ducks	Number of Geese	Number of Coots	Total Birds Shot	Ave. Birds Shot	Number of Pheasants	Adult Hunters	Junior Hunters	Weather Conditions
BUTTE VALLEY											
TOTALS TO DATE	4454	240	245	93	0	338	1.41	0	168	0	
ASH CREEK											
Jan/04 - Jan/11	240	31	0	25	0	25	0.81	0	0	0	
TOTALS TO DATE	2400	250	443	64	0	507	2.03	0	44	4	
HONEY LAKE											
TOTALS TO DATE	7260	2686	2066	319	14	2399	0.89	243	184	0	
GRAY LODGE											
TOTALS TO DATE	15606	14157	25633	286	716	26635	1.88	844	12706	1408	
SACRAMENTO											
Jan/11 - Jan/18	138	197	0	153	0	153	0.78	0	183	14	Clear/North
TOTALS TO DATE	2328	5823	10259	897	46	11202	1.92	481	5584	239	
DELEVAN											
Jan/12 - Jan/18	109	119	0	66	0	66	0.55	0	108	11	Clear/North
TOTALS TO DATE	3640	5406	11708	891	32	12631	2.34	344	5111	295	
COLUSA											
TOTALS TO DATE	2880	3088	6259	144	32	6435	2.08	113	2928	160	
SUTTER											
TOTALS TO DATE	2800	2879	5390	35	43	5468	1.90	79	2622	257	
GRIZZLY ISLAND											
TOTALS TO DATE	13650	9309	8622	20	165	8807	0.95	915	8965	344	
VOLTA											
TOTALS TO DATE	5250	3172	7136	3	1017	8156	2.57	85	2878	159	
LOS BANOS											
TOTALS TO DATE	3510	2766	3627	96	92	3815	1.38	76	2521	178	

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1986-87 WATERFOWL RESULTS

WILDLIFE MANAGEMENT
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HUNTER TOTALS
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Area	Scheduled Shooting Capacity	Number of Hunters	Number of Ducks	Number of Geese	Number of Coots	Total Birds Shot	Ave. Birds Shot	Number of Pheasants	Adult Hunters	Junior Hunters	Weather Conditions
SAN LUIS											
TOTALS TO DATE	3266	2637	4912	12	67	4991	1.89	51	2486	150	
KESTERSON											
TOTALS TO DATE	1740	1011	2037	15	0	2052	2.03	0	903	108	
MERCED											
TOTALS TO DATE	762	380	266	42	1	309	0.81	50	357	23	
MENDOTA											
TOTALS TO DATE	23400	12261	25927	40	302	26269	2.15	262	11063	762	
KERN											
TOTALS TO DATE	1655	1638	4250	3	25	4278	2.61	0	1350	96	
PERRIS											
TOTALS TO DATE	600	452	824	0	1	825	1.83	0	392	6	
SAN JACINTO											
TOTALS TO DATE	720	34	11	0	1	12	0.35	0	11	0	
WISTER											
Jan/12 - Jan/18	375	299	0	135	0	135	0.42	0	294	5	Clear
TOTALS TO DATE	7175	8919	12636	819	105	13560	1.52	0	8448	471	
RAMER											
Jan/12 - Jan/18	420	0	0	0	0	0	0.00	0	0	0	Clear
TOTALS TO DATE	5460	167	138	9	0	147	0.88	0	81	8	
GRAND TOTALS	108646	77256	132369	3788	2659	138826	1.80	3573	68656	4623	

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SPECIES TOTALS
Page 1

Area	Malla	Gadw	AmWid	Pintl	Grntl	Cinn	NShov	Red	Canv	RgNk	Sca	Ruf	Gol	Rudy	Wod	Fuv	Othr	Cand	WhFt	Cac	Snow	Ross	Othr
BUTTE VALLEY																							
TOTALS TO DATE	75	11	54	25	43	-	28	1	5	-	1	1	-	-	-	-	1	76	13	-	3	1	-
ASH CREEK																							
Jan/04 - Jan/11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-
TOTALS TO DATE	273	23	58	23	24	-	1	1	-	-	-	-	-	-	-	-	48	62	-	-	-	-	2
HONEY LAKE																							
TOTALS TO DATE	843	238	414	208	119	23	142	12	6	4	4	21	15	21	4	-	-	351	1	-	63	4	-
GRAY LODGE																							
TOTALS TO DATE	4858	6358	2744	4342	4564	438	3135	7	27	704	47	50	7	128	211	-	13	-	5	-	240	51	-
SACRAMENTO																							
Jan/11 - Jan/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	136	17	-
TOTALS TO DATE	1858	1528	1568	1839	1113	235	1622	21	24	171	25	70	6	49	31	-	6	-	38	-	782	76	1
DELEVAN																							
Jan/11 - Jan/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	57	9	-
TOTALS TO DATE	2231	1811	1825	1865	2219	196	1924	19	21	128	14	34	9	94	27	-	1	-	123	-	656	113	-
COLUSA																							
TOTALS TO DATE	1635	673	1453	578	1023	183	432	11	35	166	6	13	6	81	68	-	2	-	8	-	88	37	-
SUTTER																							
TOTALS TO DATE	2424	235	579	647	448	149	686	2	13	110	4	12	4	23	61	-	1	2	4	-	17	12	-
GRIZZLY ISLAND																							
TOTALS TO DATE	2844	187	1189	1936	1643	73	1291	4	29	90	21	50	37	80	8	-	8	3	11	-	3	2	1
VOLTA																							
TOTALS TO DATE	884	341	307	1186	2666	765	888	15	5	24	15	5	5	69	9	-	2	-	-	-	3	-	-
LOS BANOS																							
TOTALS TO DATE	998	253	148	387	946	107	387	3	15	84	6	4	6	19	34	-	6	-	-	7	84	5	-

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DEPARTMENT OF FISH AND GAME

1986-87 WATERFOWL RESULTS

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SPECIES TOTALS

Area	Malla	Gadw	AmWid	Pintl	Grntl	Cinn	NShov	Red	Canv	RgNk	Sco	Buf	Gol	Rudy	Wod	Fuv	Othr	Cand	Whft	Cac	Snow	Ross	Othr
SAN LUIS																							
TOTALS TO DATE	1384	302	282	304	2105	36	406	3	36	205	4	1	-	13	22	-	2	-	-	-	8	4	-
KESTERSON																							
TOTALS TO DATE	560	93	111	274	630	47	211	10	68	75	3	2	2	24	6	-	1	-	-	-	15	-	-
MERCED																							
TOTALS TO DATE	47	9	9	56	97	4	41	1	-	3	-	1	-	-	-	-	-	-	1	-	38	13	-
MENDOTA																							
TOTALS TO DATE	4626	828	987	6981	7765	1326	2470	97	130	438	49	19	9	153	83	1	26	1	3	-	31	5	-
KERN																							
TOTALS TO DATE	601	283	411	820	768	341	856	106	8	83	3	4	-	44	1	-	1	8	1	-	-	-	-
PERRIS																							
TOTALS TO DATE	288	26	95	62	268	5	17	9	1	36	58	-	-	38	-	-	5	-	-	-	-	-	-
SAN JACINTO																							
TOTALS TO DATE	1	1	3	-	-	-	-	-	-	-	3	1	-	2	-	-	1	-	-	-	-	-	-
WISTER																							
Jan/12 - Jan/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-	80	18	1
TOTALS TO DATE	283	239	652	2444	4802	716	2681	186	44	22	69	16	3	319	2	-	8	154	-	42	869	83	1
RAMER																							
Jan/12 - Jan/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTALS TO DATE	4	-	13	16	65	26	3	3	4	3	3	-	-	1	-	-	-	8	-	-	-	2	-
GRAND TOTALS	35583	1061	12727	24483	31320	4582	17228	511	451	2367	315	304	108	1169	558	1	115	558	287	48	2882	376	5

STATE OF CALIFORNIA
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Wildlife Management Branch

WATERFOWL HUNTING SEASON REPORT ______________ ____ 19____

AREA San Luis NWR ______ COUNTY ______________

PERCENT OF WATER ACREAGE IN OPEN AREA ______________ CLOSED AREA ______________

TOTAL ACREAGE ________ ACRES OPEN ________ MAXIMUM QUOTA OF SHOOTERS ALLOWED ____________

DATE	TOTAL HUNTERS	DUCKS KILLED	GEESE KILLED	COOTS KILLED	TOTAL WATERFOWL KILLED	WATERFOWL PER HUNTER	WEATHER
1967-68	3769	10115	169	153	10 437	2.77	
68-69	4503	9065	250	174	9489	2.11	
69-70	5401	12519	365	322	13206	2,45	
70-71	6836	13723	336	433	14492	2,12	
71-72	5321	11280	877	368	12525	2,35	
72-73	5645	10437	603	525	11565	2,05	
73-74	6147	11172	328	371	11871	1.93	
74-75	6040	12788	428	461	13677	2,26	
75-76	5748	11660	56	212	11928	2,08	
76-77	5603	12433	91	93	12617	2.25	
77-78	4469	7212	76	138	7426	1,66	
78-79	4459	9040	36	183	9259	2,08	
79-80	4145	8115	20	239	8374	2,02	
80-81	4056	8666	32	310	9008	2,22	
81-82	3269	5548	18	69	5635	1.72	
82-83	3275	5674	30	183	5887	1,80	
83-84	3689	6521	20	180	6721	1,82	
84-85	2934	4744	22	36	4802	1.60	
85-86	2770	6157	120	116	6293	2,27	
86-87	2686	4912	12	67	4991	1,91	

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME
Wildlife Management Branch

WATERFOWL HUNTING SEASON REPORT ______________ 19____

AREA Kesterson ______________ COUNTY ______________

PERCENT OF WATER ACREAGE IN OPEN AREA ______________ CLOSED AREA ______________

TOTAL ACREAGE ________ ACRES OPEN ________ MAXIMUM QUOTA OF SHOOTERS ALLOWED ________

DATE	TOTAL HUNTERS	DUCKS KILLED	GEESE KILLED	COOTS KILLED	TOTAL WATERFOWL KILLED	WATERFOWL PER HUNTER	WEATHER
70-71	2643	5510	224	263	5997	2.27	
71-72	3608	7880	254	355	8492	2.35	
72-73	3873	7146	260	457	7862	2.03	
73-74	3189	4115	193	661	4969	1.56	
74-75	4257	10384	157	675	11216	2.63	
75-76	4434	8402	52	687	9153	2.06	
76-77	4108	9974	124	306	10409	2.53	
77-78			Closed				
78-79	3045	6260	31	197	6488	2.12	
79-80	2418	3713	33	254	4000	1.65	
80-81	1876	3127	17	242	3386	1.80	
81-82	1536	1866	34	48	1948	1.27	
82-83	2319	4153	27	118	4298	1.85	
83-84	2318	4459	24	341	4824	2.08	
84-85	1285	2294	21	261	2576	2.00	
85-86	994	2023	103	-0-	2126	2.14	[illegible] hunting [illegible]
86-87	1011	2052	15	-0-	2067	2.04	

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME
Wildlife Management Branch

WATERFOWL HUNTING SEASON REPORT ______________ ____ 19____

AREA Delta COUNTY ______________

PERCENT OF WATER ACREAGE IN OPEN AREA ______________ CLOSED AREA ______________

TOTAL ACREAGE ________ ACRES OPEN ________ MAXIMUM QUOTA OF SHOOTERS ALLOWED ________

DATE	TOTAL HUNTERS	DUCKS KILLED	GEESE KILLED	COOTS KILLED	TOTAL WATERFOWL KILLED	WATERFOWL PER HUNTER	WEATHER
1960-61	3461	9058	92	130	9280	2.68	
61-62	3174	6805	42	58	6905	2.1	
62-63	3045	5237	101	235	5573	1.8	
63-64	3928	10654	145	264	11063	2.81	
64-65	3422	5456	38	138	5632	1.6	
65-66	3124	7529	34	190	7753	2.4	
66-67	3703	8851	151	333	9335	2.5	
67-68	4601	13192	109	345	13646	2.96	
68-69	4524	8112	119	437	8668	1.9	
69-70	6323	15588	62	843	16493	2.60	
70-71	6843	15555	169	694	16418	2.4	
71-72	6678	15269	473	732	16474	2.46	
72-73	6343	12218	60	466	12744	2.00	
73-74	5437	6272	194	1124	7590	1.38	
74-75	6871	15547	78	944	16569	2.4	
75-76	6999	14640	90	558	15288	2.18	
76-77	6816	17360	205	560	18125	2.7	
77-78	5474	6762	306	739	7807	1.4	
78-79	6680	17073	17	336	17426	2.6	
79-80	5963	12039	20	499	12558	2.1	
80-81	4710	9898	27	375	10300	2.2	
81-82	3532	5406	4	298	5708	1.62	
82-83	4255	7975	23	239	8237	1.94	
83-84	3951	7797	22	415	8234	2.08	
84-85	2629	3909	12	206	4127	1.57	
85-86	3074	6600	39	311	6950	2.26	
86-87	3172	7126	3	1037	8166	2.57	2.25

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME
Wildlife Management Branch

WATERFOWL HUNTING SEASON REPORT ______________ ____ 19____

AREA Los Banos WA COUNTY ______________

PERCENT OF WATER ACREAGE IN OPEN AREA ______________ CLOSED AREA ______________

TOTAL ACREAGE ______ ACRES OPEN ______ MAXIMUM QUOTA OF SHOOTERS ALLOWED ______

DATE	TOTAL HUNTERS	DUCKS KILLED	GEESE KILLED	COOTS KILLED	TOTAL WATERFOWL KILLED	WATERFOWL PER HUNTER	WEATHER
1961-62	2740	5391	287	50	5728	2.09	
62-63	3091	4607	263	81	4951	1.60	
63-64	3844	7885	200	167	8252	2.15	
64-65	3770	5423	113	782	6318	1.68	
65-66	3307	6327	48	156	6531	1.97	
66-67	3586	6241	531	210	6982	1.95	
67-68	3971	8116	162	250	8528	2.15	
68-69	3727	4415	181	278	4874	1.31	
69-70	4315	6687	179	290	7156	1.66	
70-71	5296	8102	318	518	8938	1.69	
71-72	4519	6997	473	500	7970	1.74	
72-73	4704	5640	193	878	6760	1.44	
73-74	4769	3802	269	1154	5225	1.10	
74-75	4804	8438	270	1244	9952	2.03	
75-76	5533	10557	712	846	12,115	2.19	
76-77	5198	9251	595	540	10,386	2.00	
77-78	4736	4366	449	621	5436	1.15	
78-79	4681	8227	221	283	8731	1.87	
79-80	4292	5275	144	502	5921	1.38	
80-81	3722	5000	174	313	5487	1.47	
91-82	3329	3683	164	207	4054	1.19	
82-83	3447	5000	143	230	5373	1.56	
83-84	3434	4151	186	268	4605	1.34	
84-85	3060	3447	120	100	3667	1.22	
85-86	2940	4754	203	121	5078	1.82	
86-87	2631	3626	96	93	3815	1.45	

The San Luis National Wildlife Refuge is operated by the U.S. Fish & Wildlife Service. The refuge is primarily managed to provide migration and wintering habitat for migratory waterfowl, to provide habitat for other animals, and to provide you with a place to see and enjoy wildlife in a natural setting. Please help us preserve the delicate ecological balance by not destroying the habitat or polluting it with waste. Please do not spoil the area by littering.

GENERAL REFUGE REGULATIONS.

1. Regulations are necessary to prevent public disturbance to refuge wildlife and the associated habitat. Please obey all regulatory signs while visiting the refuge.
2. Travel is restricted to the Main Tour Drive and the Tule Elk Drive. Off-road traffic is not permitted.
3. THE REFUGE IS OPEN ONLY DURING DAYLIGHT HOURS (1/2 hour before sunrise to 1/2 hour after sunset).
4. Rifles and pistols are not permitted on the area except when broken down or cased. Shotguns are permitted within the waterfowl hunting area only during the regular waterfowl hunting season.
5. Open fires and overnight camping are prohibited.
6. Please observe anti-litter laws.
7. All pets must be kept on a leash.
8. Maximum speed - 25 mph.

NATURE STUDY - WILDLIFE OBSERVATION

1. Wildlife may be observed and photographed from the Main Tour Drive and the Tule Elk Drive.
2. The Main Tour Drive is open on a daily basis except during the waterfowl hunting season. During this period, the Main Tour Drive will only be open on Mondays, Tuesdays, Thursdays, and Fridays.
3. The Tule Elk Drive is open throughout the entire year.
4. While using the Main Tour Drive all traffic, vehicular & foot, is restricted to the road right-of-way. This is to help protect the wildlife from excess disturbance.
5. Foot-traffic, hiking and photography is encouraged along both Salt Slough and the San Joaquin River. Access is limited, however, as portions of both water courses are closed to protect nesting birds.

HUNTING

Hunting of certain species is allowed on specified days during the open season. Hunting is by permit only. For detailed information, inquire at the check station or refer to "Regulations for Hunting on State and Federal Areas". Hunting is managed by the California Department of Fish and Game in cooperation with the United States Fish and Wildlife Service.

FISHING

1. Fishing is permitted during daylight hours only.
2. Fishing is allowed in Salt Slough and the western bank of Deadman Slough.

FOR FURTHER INFORMATION CONTACT:

Refuge Manager
San Luis National Wildlife Refuge Complex
340 "I" Street
Post Office Box 2176
Los Banos, CA 93635
Phone: 209-826-3508

U.S. FISH & WILDLIFE SERVICE/SAN LUIS NATIONAL WILDLIFE REFUGE COMPLEX
MERCED COUNTY, CALIFORNIA

PUBLIC USE OPPORTUNITIES - FALL/WINTER 1987-88

SAN LUIS REFUGE - Daytime use (1/2 hour before sunrise to 1/2 hour after sunset)

1. Main Tour Route
   a. October 24 through January 10 - Open only Mondays, Tuesdays, Thursdays and Fridays.

2. Tule Elk Drive/Salt Slough
   a. Open 7 days per week, 365 days/year

Items of Interest: Tule elk herd; large concentrations of waterfowl, especially at dawn and dusk; native plant communities, riparian vegetation; raptors, fishing, waterfowl hunting (see applicable State regulations). Hiking encouraged along Salt Slough.

MERCED REFUGE

1. Tour Route
   a. Open daily, 1/2 hour before sunrise to 1/2 hour after sunset except: Refuge will be closed to all non-hunting use during the pheasant hunting season. This total closure will be in effect from Saturday, November 14, 1987, through Sunday, November 22, 1987. We suggest that you visit San Luis Refuge during this time period.

Items of Interest: Large concentrations of snow and Ross' geese (usually after December 1); lesser sandhill cranes; pintail ducks; plus variety of shorebirds. Pheasant and waterfowl hunting (see applicable State regulations).

Caution: Due to the small size of the Refuge, hiking on the tour route tends to disturb the concentrated wildlife and is therefore prohibited. Your vehicle is your best blind! Fog is very common at Merced during December and January and birding is often better during the mid-day period.

KESTERSON REFUGE

1. Foot Traffic Only. Use main entrance/parking lot on Highway 140. The entire evaporation pond area off Gun Club Road is closed to all public use.

2. October 24 through January 10 - open only Mondays, Tuesdays, Thursdays and Fridays.

Items of Interest: Variety of wildlife species associated with pristine grassland community; dense stands of Iodine bush; waterfowl concentrations. Waterfowl hunting (see applicable State regulations).

General Information: Heavy rainfall may cause temporary closure of Refuge tour roads to vehicle traffic. Visitors should call Refuge Office (209) 826-3508 for information. Refuge regulations are available at visitor information booths at San Luis and Merced or may be obtained by writing to the Refuge Manager, San Luis National Wildlife Refuge Complex, P.O. Box 2176, Los Banos, California 93635.

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